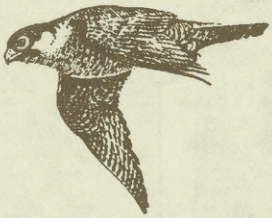
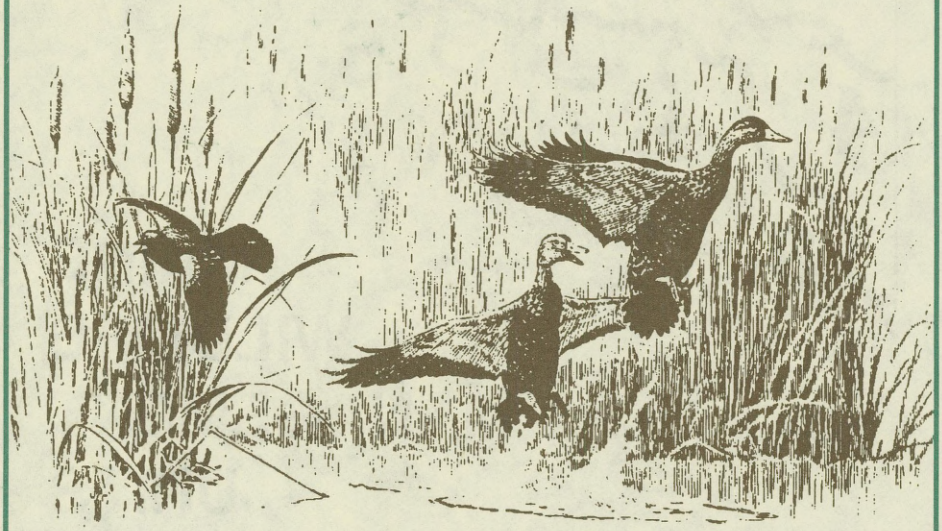


Maine Department of
Inland Fisheries
and Wildlife

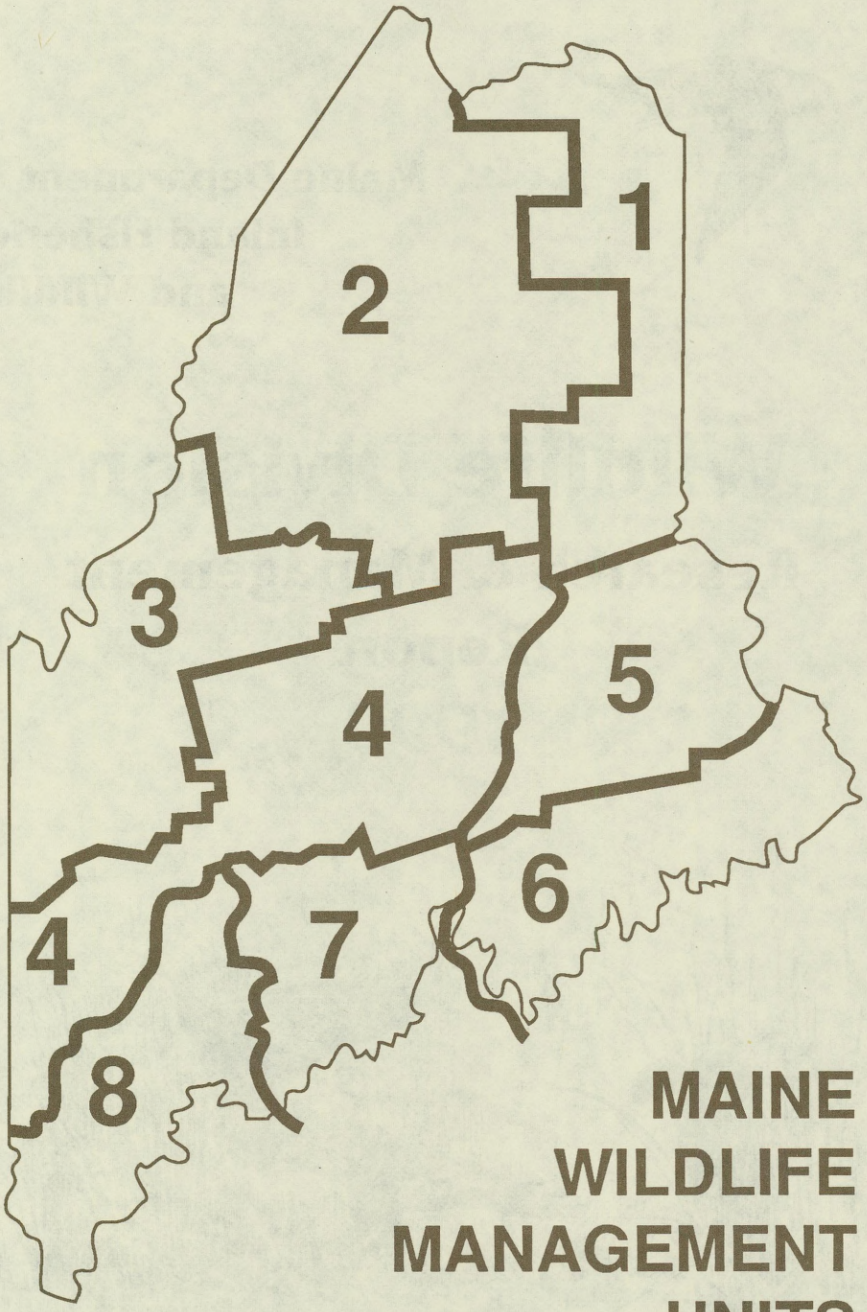
Wildlife Division

Research & Management Report

1990



A Report to William J. Vail, Commissioner



MAINE WILDLIFE MANAGEMENT UNITS

COVER ART COURTESY NED SMITH, PENN STATE

FOREWORD

Maine's many different landscapes provide a home for a rather unusual blend of wildlife species, many of which occur at the northern or southern limits of their range. Climatic conditions, topography, and the nature of agricultural land, forests, and adjoining wetland and marine habitat change dramatically as one travels from east to west, and north to south. As a result, each region of the state has its own assortment of wildlife conservation problems and needs.

Each year, the Wildlife Division undertakes a broad array of projects designed to monitor the status and needs of the state's wildlife resources. This work includes many traditional game management programs, as well as an increasing number of initiatives directed toward restoration of threatened and endangered species and identification and protection of important wildlife habitat.

This report summarizes the Division's species management programs. We hope it will give you a better understanding of the status of Maine's wildlife, and the programs that maintain, and hopefully enhance, these highly valued resources.

These studies are financed in part through Federal Aid in Wildlife Restoration Funds under Projects 81D, 82R, and 83C. The Nongame and Endangered Species Project is funded in part by the Endangered Species Conservation Act.

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INTRODUCTION

Changes of major significance have occurred since publication of the last Wildlife Division Research and Management Report in 1989. A partial list of these changes include: protection of over 150 bald eagle nest sites as "Essential Habitat" under the amended Maine Endangered Species Act; establishment of major laws which direct the Department to identify "Significant Wildlife Habitats" for protection; shortening of black bear hunting seasons; issuing of a permit to hunt black bears; moving the moose hunting season to the fourth week of September; and establishment of another Deer Management District.

This past year, the Wildlife Division has also been involved in a number of other activities. To name a few: we have been developing assessments for piping plover and three tern species; evaluating new moose and breeding waterfowl census techniques; developing a population model for black bears; revising the beaver, marten, and fisher management systems; transplanting wild turkeys from Connecticut to Maine; and identifying key parcels of land for acquisition by the Department, the Land for Maine's Future Board, and The Nature Conservancy.

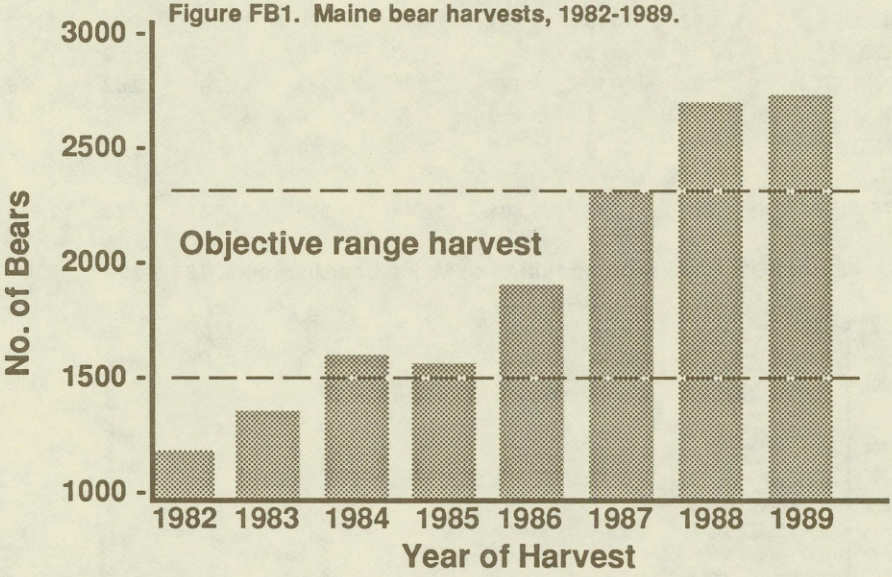
Every year, demands on the Department and the Wildlife Program increase and issues become more complex. The challenge is to meet these demands by priority and to address the issues in a well-informed and professional manner. We sincerely hope we are meeting this challenge.

BLACK BEAR AND FURBEARERS

BLACK BEAR

Maine's 1989 black bear season opened August 28 and closed November 30. Bears could be hunted over bait from August 28 until November 10, and hunted with dogs from August 28 through October 27. The bear trapping season opened September 1 and closed October 31. The 2,690 bears harvested during the 13 1/2-week season represented another record harvest, continuing the trend of annually increasing harvests since 1985 (Figure FB1).

Figure FB1. Maine bear harvests, 1982-1989.



Geographic Distribution Of The Harvest

Bears were harvested in 12 of the State's 16 counties in 1989 (Table FB1). The greatest number of bears (863) was registered in Aroostook County, which yielded 32% of the statewide harvest, followed by Piscataquis County with 462 bears (17%). No bears were harvested in Androscoggin, Knox, Lincoln, or Sagadahoc counties.

All Wildlife Management Units (WMU) contributed to the bear harvest (Table FB2). WMU 2 accounted for 779 bears, or 29% of the State harvest, followed by WMU 1 with 528 bears (20%) and WMU 3 with 443 bears (16%).

Table FB1. Maine bear harvests by county, 1982-1989.

COUNTY OF HARVEST	YEAR 1982	1983	1984	1985	1986	1987	1988	1989
ANDROSCOGGIN	3	2	0	2	1	1	0	0
AROOSTOOK	320	329	461	454	657	694	876	863
CUMBERLAND	1	2	3	3	0	5	2	4
FRANKLIN	64	86	94	112	123	151	133	171
HANCOCK	36	70	56	48	78	92	141	99
KENNEBEC	0	3	0	3	2	4	1	3
KNOX	0	0	0	0	5	1	0	0
LINCOLN	0	1	0	0	2	0	0	0
OXFORD	67	88	111	90	125	158	195	148
PENOBSCOT	197	310	200	265	228	322	310	351
PISCATAQUIS	226	234	254	229	300	426	424	462
SAGADAHOC	0	0	0	0	0	0	0	0
SOMERSET	182	176	241	197	268	315	301	330
WALDO	1	0	2	0	0	2	0	2
WASHINGTON	102	110	179	139	163	220	282	248
YORK	2	1	0	2	3	3	4	4
UNKNOWN	20	0	0	0	0	0	4	0
STATEWIDE	**1,221**	**1,412**	**1,601**	**1,544**	**1,955**	**2,394**	**2,673**	**2,690**

Figure FB2. Weekly composition of Maine bear harvests, 1982–1989.

Timing Of The Harvest

Nearly one-third of the harvest occurred during the first week of the season, and 53% of the harvest was recorded within the first 2 weeks (Figure FB2). Harvest rate slowed through October and November, although the harvest increased slightly in late October during the first few days of the firearms deer season.

Hunters took 693 bears (26%) during the 4 hunting days in August, but most of the 1989 harvest occurred during September, when 1,387 bears (52%) were registered. An additional 423 bears (16%) were tagged in October, and 187 bears (7%) were killed in November (Table FB3). The high harvest rate in August and September supports reports of high bear response to bait and heavy hunting pressure across much of the State early in the season.

Table FB2. Maine bear harvests by Wildlife Management Unit (WMU), 1982-1989.

	YEAR							
WMU	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**
1	197	292	310	322	367	431	503	528
2	323	248	391	364	618	667	816	779
3	201	199	276	254	329	393	392	443
4	270	383	301	291	288	444	384	429
5	164	212	242	214	263	292	360	328
6	61	69	79	90	77	154	194	171
7	1	2	0	1	8	5	0	3
8	4	7	2	8	5	8	1	6
UNK	0	0	0	0	0	0	23	0
STATE	**1,221**	**1,412**	**1,601**	**1,544**	**1,955**	**2,394**	**2,673**	**2,690**

Table FB3. 1989 Maine bear harvest by month and method of take.

	MONTH				
METHOD OF TAKE	**AUG**	**SEPT**	**OCT**	**NOV**	**COMB.**
HUNTING WITH BAIT	602	992	103	1	1,698
HUNTING WITH DOGS	26	208	163	0	397
TRAPPING	0	42	13	0	55
UNKNOWN	65	145	144	186	540
TOTAL	**693**	**1,387**	**423**	**187**	**2,690**
ARCHERY	74	135	30	1	240
ASSISTED BY GUIDE	435	802	189	3	1,429

Figure FB3. Percent of Maine bear harvests registered by resident hunters,1982–1989 .

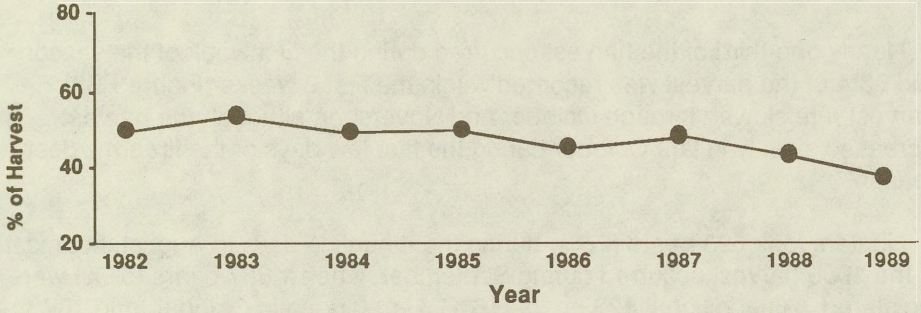
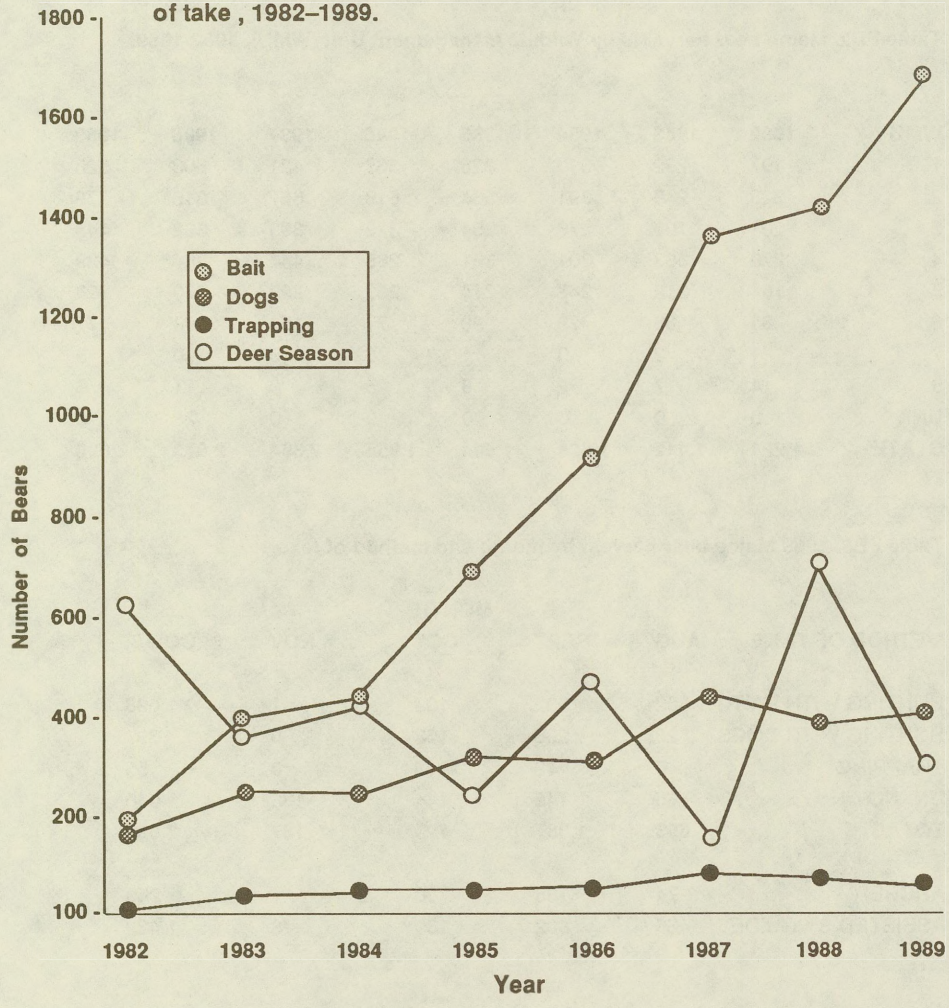


Figure FB4. Maine bear harvests by reported method of take , 1982–1989.



The light November harvest reflected early den entry by bears in northern Maine. Field personnel reported substantial deer hunting pressure during the month, but a poor beechnut crop caused many bears to den early. Most radio-collared research bears in northern Maine denned during mid October. Bears generally enter their dens during October in years of scarce fall foods (such as 1989), and delay denning until November in years when fall foods are abundant. As a result, November harvests have fluctuated widely, ranging from 174 to 612 bears since 1982.

Residence Of Successful Hunters

Maine residents harvested 952 bears, or 35% of the harvest. Despite large increases in harvest size since 1982, the proportion of bear harvests taken by Maine residents has declined only slightly (Figure FB3), indicating that interest in bear hunting continued to grow among resident sportsmen as well as nonresidents. No firm estimates of the number of hunters pursuing bears are available, but reports from field personnel, registered guides, hunters, and landowners suggest that numbers of sportsmen pursuing bears increased steadily throughout the 1980's.

The 1,738 bears harvested by nonresidents were taken by hunters residing in 33 states, the District of Columbia, 2 Canadian provinces, Switzerland, and Germany. The largest number of successful nonresident hunters were from Pennsylvania (376), Massachusetts (284), New Jersey (206), and New York (197). The percentage of the harvest taken by nonresidents ranged from 0% in WMU 7 to 86% in WMU 2.

Methods Used By Successful Hunters

Bears could be hunted over bait, with dogs, over natural food sources, trapped, or taken incidentally by hunters pursuing other species (usually deer or birds). Method of take was recorded for 2,150 bears, or 80% of the harvest (Table FB3).

Hunting with Bait

The number of bears harvested over bait in 1989 (1,698) increased 22% over the high level experienced in 1988 (1,388 bears)(Figure FB4). Bait was used by successful hunters in WMU's 1-6 (Table FB4). Hunting over bait was the most popular method used by successful hunters in WMU 2, accounting for 659 bears or 85% of the Unit's harvest. Most bears taken over bait (992 or 58%) were harvested in September, but 602 (35%) were taken during the four hunting days in August; 103 more (6%) were taken with bait in October, and only 1 bear was taken over bait in November (Table FB3). Seventy-four percent of successful baiters were nonresidents, and 47% of successful resident hunters used bait.

Hunting with Dogs

Hunters using dogs harvested 397 bears (15% of the total harvest). Dogs were used to take bears in WMU's 1-6 (Table FB4) where they accounted for 4-30% of each Unit's harvest. Hunters using dogs took only 4% of the harvest in WMU 2. Maintaining contact with dogs in the remote, unsettled woods of WMU 2 is difficult, and houndsmen may avoid hunting this region. Although over half of the successful hunters using dogs (52%) took their bears in September, they continued to take bears throughout October (Table FB3). Most successful hunters using dogs (304, or 77%) were nonresidents; only 93 successful Mainers (10% of successful residents) used dogs to take their bear.

Trapping

Traditionally, a small but consistent percentage of the bear harvest is recorded by trappers. In 1989, 55 bears (2% of the harvest) were registered as trapped. Most of the trapping harvest (42 bears) occurred in September (Table FB3). Maine residents accounted for 97% of the trapped bears.

Harvest During The Firearms Deer Season

Hunters tagged 281 bears during the firearms deer season (October 28 - November 25) in 1989—far less than the 701 bears taken during this period in 1988. Method of take was not reported for 278 bears taken during the deer season, but most of these bears probably were taken incidentally by deer hunters. Sixty-six percent of the bears taken during the firearms deer season were harvested by resident sportsmen — considerably higher than the portion of the harvest taken by residents before the deer season opened (34%).

Archery Hunting

The 1989 archery bear harvest was nearly double the size of the 1988 archery kill. Bowhunters accounted for 240 bears, or 9% of the harvest in 1989 (Table FB3), versus 133 bears in 1988. Archers took 57 bears in WMU 3, and 52 bears in WMU 2. Most bow-killed bruins (135) were taken in September (Table FB3). Archers used bait to take 191 bears, and harvested 42 bears using hounds. Nonresident archers took 167 bears, or 70% of the archery harvest.

Assistance By Registered Maine Guides

About 53% of successful hunters (1,429) employed Registered Maine Guides to assist them during their hunt. Guides aided successful hunters in WMU's 1-6, and helped take 70% of the harvest in WMU 2 (Table FB4). Over half of the bears harvested in August and September, and 45% of the bears

Table FB4. 1989 Maine bear harvest by Wildlife Management Unit and method of take.

METHOD OF TAKE	WILDLIFE MANAGEMENT UNIT 1	2	3	4	5	6	7	8	UNK	STATE
HUNTING WITH BAIT	329	659	249	200	165	94	0	0	2	1,698
HUNTING WITH DOGS	52	28	103	74	97	43	0	0	0	397
TRAPPING	3	9	18	15	4	5	0	1	0	55
UNKNOWN	144	83	73	140	62	29	3	5	1	540
TOTAL	**528**	**779**	**443**	**429**	**328**	**171**	**3**	**6**	**3**	**2,690**
ARCHERY	35	52	57	49	32	15	0	0	0	240
ASSISTED BY GUIDE	234	540	243	160	184	67	0	0	1	1,429

harvested in October, were taken with the assistance of guides (Table FB3). Only 3 hunters taking bears in November used a guide. Most successful hunters using guides were nonresidents (1,313); only 116 successful residents (12%) employed a guide. Guides assisted 64% (1086) of successful bait hunters, and 87% (344) of successful hunters using dogs.

Sex And Age Distribution Of The Harvest

The 1989 harvest included 1,341 males (50%), and 1,309 females (49%); sex was not recorded for 40 bears (Table FB5). Although males dominated the harvest in August, the sex ratio was about equal in September, and more females than males were killed in October and November. A closer look at the take by hunting method reveals that trappers and hunters using bait took more males, hunters using dogs harvested slightly more males than females, and the kill by unreported methods produced more females from September through

Table FB5. Sex composition of the 1989 Maine bear harvest by month and method of take.

METHOD OF TAKE	MONTH AUGUST (M/F/U) [1]	SEPTEMBER (M/F/U)	OCTOBER (M/F/U)	NOVEMBER (M/F/U)	SEASON (M/F/U)
HUNTING WITH BAIT	323/271/8	498/480/14	49/53/1	1/0/0	871/804/23
HUNTING WITH DOGS	16/10/6	106/101/1	81/80/2	0/0/0	203/191/3
TRAPPING	0/0/0	27/14/1	7/6/0	0/0/0	34/20/1
UNKNOWN	43/22/0	49/92/4	62/75/7	79/105/2	233/294/13
TOTAL	**382/303/8**	**680/687/20**	**199/214/10**	**80/105/2**	**1341/1309/40**
ARCHERY	39/32/3	66/68/1	19/10/1	0/1/0	124/111/5
ASSISTED BY GUIDE	234/194/7	392/401/9	91/96/2	2/1/0	719/692/18

[1]M = male, F = female, U = unknown

November (Table FB5). Hunters using dogs harvested more males through September, and produced nearly equal numbers of males and females in October. These differences probably reflect changes in behavior of male and female bears and their vulnerability to various hunting techniques during the fall months, and/or different levels of selectivity for large bears by hunters using various techniques.

Statewide, hunters and trappers registered 2,328 adult bears (87%) and 322 cubs of the year (12%); age was not reported for 40 bears (1%). Only 5% of the bears taken over dogs were recorded as cubs. About 9% of the bears harvested over bait or taken by trappers were cubs, and 24% of the kill by unreported methods was registered as cubs of the year. The low percentage of cubs in the harvest is consistent with percentages reported in recent years, and is considered an overestimate of the actual cub harvest. Aging studies conducted by the Department in the early 1980's indicated that about half of the bears registered as cubs of the year were actually older. This disparity is a result of the slow growth of Maine bears, and the difficulty of estimating the age of a bear in the field.

Prospects for the 1990 Season

The 1990 bear season will be shorter and more complex than recent seasons have been. The general hunting season will open August 27 and close September 22, then reopen during the 4-week firearms deer season (October 27 - November 24). Bears may be hunted over bait from August 27 until September 22. A season for bear hunting with dogs will run from September 15 through October 26. The bear trapping season will open October 1 and close October 31. A bear hunting permit ($2 resident, $10 nonresident) will be required before hunting bears during open seasons preceding the firearms deer season. The number of permits will not be limited and hunters may purchase permits throughout the bear season.

Maine's spring 1990 bear population is estimated at approximately 18,000-19,000 animals, slightly below the Department's objective level of 21,000 bears. The shortened bear season is expected to reduce the 1990 harvest to 2,300 bears or less. Harvests below this level are needed to permit the bear population to increase to the 21,000 level.

Research and Management

Bear harvests have been monitored by mandatory registration data since 1969. Since 1975, the Department's Bear Study has been supplying information on reproduction, survival, movements and behavior of Maine bears for management purposes.

The Bear Study's field research efforts are concentrated in 3 study areas of about 144 mi^2 each that represent north woods, farmland transition, and farmland habitat types. Radio-telemetry studies are underway in each of these areas as well as live-capture work that supplies additional population information. We monitor about 50 radio-collared female bears and capture and handle about 150 bears annually. All yearling female cubs born to collared adult females are collared during winter den visits, and additional females are trapped during the summer months.

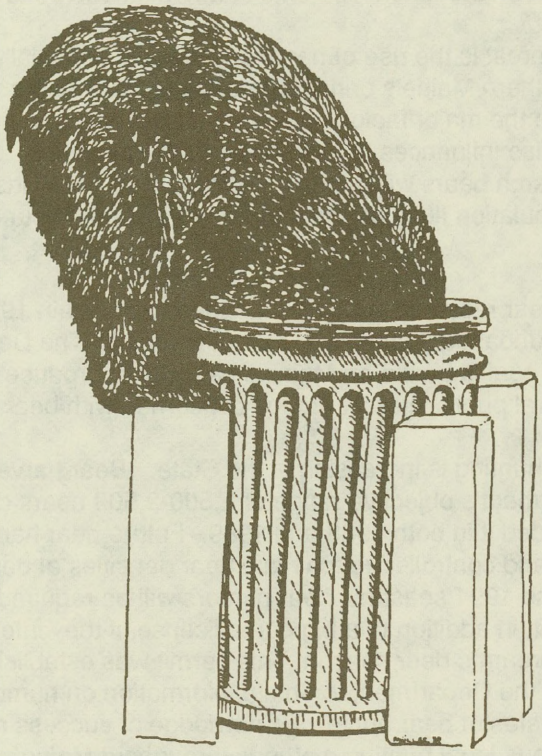
Research efforts are focused on the reproductive success, survival, growth rates, densities, movements, and habitat-use patterns of bears inhabiting the study areas. This information, applied to similar habitat regions throughout Maine's bear range, is the primary means of assessing the status of the statewide bear population. We are currently analyzing information on bear densities, reproduction, and survival from the past decade. This information will form the basis of a population model that will help guide future management by predicting trends in bear numbers. The model is being constructed in conjunction with the University of Maine, which has also assisted in our efforts to analyze information on the fall movements and habitat use patterns of bears.

Of particular interest is the use of hardwood stands, especially beech. Beechnuts are northern Maine's principal late-fall food for bears. Beechnut abundance may be the major factor influencing cub production in Maine's north woods and also influences bears' vulnerability to hunting. Continued monitoring of research bears will provide the Department with insights into causes of bear population fluctuations and allow us to refine our management program.

Maine's black bear resource is being managed to maintain 1985 levels of distribution and abundance (estimated at 21,000 bears). The Department's bear management goal is based on Maine's capacity to produce bears, as well as input from several public interest groups concerned with bears.

Interest in bear hunting is increasing in the State. Bear harvests rose through the Department's objective range of 1,500-2,500 bears during the mid 1980's, and exceeded it in both 1988 and 1989. Future bear harvests must be closely monitored and controlled to maintain bear densities at desired levels. During the 1990 and 1991 seasons, bear hunters will be required to obtain a bear hunting permit, in addition to a big game license, if they intend to hunt bears prior to the firearms deer season. This permit was established by the legislature to allow the Department to obtain information on numbers, distribution, and success rates of bear hunters. Knowledge of success rates of hunters employing various legal hunting methods throughout Maine's bear range is needed to reliably assess the impact of hunting on the bear population and control future bear harvests.

If interest in bear hunting and hunter numbers continue to mount, allocation of area-specific bear licenses or permits will be necessary for adequate control of bear harvests. At present, the Commissioner of Inland Fisheries and Wildlife lacks authority from the Legislature to effectively regulate bear hunting. Without this authority, restriction in season length is the only management option available to limit the harvest of bears.



FURBEARERS

Maine's upland furbearers include coyote, fox (both red and gray), bobcat, Canada lynx, fisher, marten, raccoon, skunk, and weasels (short and long-tailed). Canada lynx are protected and cannot be taken by hunting or trapping. Aquatic furbearers in Maine include beaver, otter, mink, and muskrat. All furbearers except lynx may be taken by trapping, and fox, coyote, bobcat, raccoon, and skunk may be taken by hunting.

1989-90 Fur Harvest

The general trapping season for all furbearers, except beaver, ran from October 29 to December 9. Fox and coyote could also be trapped from October 22 to October 28. Beaver season ran from December 1 to March 30 in Wildlife Management Units (WMU) 1 and 2, and from January 1 to February 28 in all other WMU's. Hunting for raccoon and skunk was allowed from October 30 to December 15. Fox hunting season ran from October 30 to February 15, and bobcat hunting season opened December 1 and closed January 31. There was no closed season on coyote hunting.

Harvests of most furbearers have dropped dramatically in the past years (Table FB6). Most of this drop can be attributed to a dramatic reduction in prices paid for pelts of most furbearers over the past 3 years (Table FB7) and consequently in the amount of trapper effort. Reduced pelt prices reflected a large surplus of lower priced ranch-raised fur, primarily mink and fox, that has lowered the call for traditionally more expensive wild furs. This surplus can be traced back, in part, to effects of the stock market crash in late 1987 that reduced the demand for fur products. Demand, as yet, has not been high enough to relieve the surplus fur situation. It is likely that low pelt prices, and therefore low trapper effort, will continue for at least a few more years.

Most serious trappers trap for recreation and will trap to some extent every year, regardless of prices paid for pelts. However, total effort expended by trappers is usually far less when pelt prices are reduced.

Table FB6. Furbearer harvests in Maine, 1985-Spring 1990.

	1985-86	1986-87	1987-88	1988-89	1989-90
Raccoon	19,328	17,328	22,025	6,439	**
Mink	2,094	2,072	3,466	2,550	2,366
Otter	802	1,037	1,035	676	753
Beaver	11,211	12,152	12,611	10,311	7,839
Marten	8,745	3,951	6,424	2,698	4,554
Fisher	2,229	1,851	2,090	1,211	1,059
Fox (R & G)	4,798	4,215	4,540	2,454	2,396
Coyote	1,393	1,151	1,631	1,251	1,215
Bobcat	277	179	91	89	152

** Raccoon pelts are no longer tagged by MDIFW.

Table FB7. Average prices paid for pelts, 1985-Spring 1990.

Species	1985-86	1986-87	1987-88	1988-89	1989-90
Raccoon	$14.00	$18.00	$10.00	$ 6.00	$ 5.00
Mink:					
Male	22.00	32.00	29.00	36.00	28.00
Female	12.00	15.00	17.00	19.00	16.00
Otter	25.00	28.00	24.00	20.00	21.00
Beaver	28.00	32.00	17.00	20.00	18.00
Marten	23.00	27.00	34.00	38.00	32.00
Fisher:					
Male	81.00	95.00	83.00	35.00	15.00
Female	161.00	183.00	171.00	91.00	50.00
Red Fox	24.00	26.00	18.00	15.00	12.00
Gray Fox	21.00	33.00	26.00	14.00	12.00
Coyote	15.00	18.00	14.00	8.00	7.00
Bobcat	81.00	87.00	69.00	48.00	30.00
Muskrat	2.40	3.60	3.80	2.00	1.00

Marten prices declined less than those of other species, and as a result, marten trapping effort remained high. Marten are fairly easy to catch, and the higher price probably encouraged some trappers to shift their efforts toward marten.

The bobcat harvest was higher this year due mostly to an increased number taken by hunters. December is usually a poor month to use hounds to trail bobcats, because typically, there is little or no snow cover, and conditions may be icy. However, conditions in December of 1989 were ideal for hunting bobcats with hounds. A light powder snow was easy on hounds' feet and made bobcat tracks highly visible. Consequently, hunter harvest of bobcats was higher than in the previous 2 years.

Management and Research

Maine's furbearer program is centered around 3 major activities: 1) development and implementation of management operational plans or "systems", 2) collection of harvest, trapper, and furbearer population data, and 3) research.

Management systems document activities for each furbearer species and include goals to be managed for, information needed, method of analysis and interpretation, and specific management actions to be recommended in different situations. Systems are reviewed and critiqued heavily within the Wildlife Division to ensure the best management techniques are being applied to each species within time and money constraints of the Department.

Harvest data are recorded by township of capture for each furbearer and are tallied to determine the number of each species caught. In addition, we

keep track of prices paid for pelts and try to measure the level of effort expended by furbearer hunters and trappers each year. To obtain better information concerning trapper effort, the Division has developed a log booklet trappers use to record their effort and trapping success. At the end of the season, cooperating trappers return an anonymous survey summarizing this information. The booklet is intended to be as useful to the trapper as it is to the Division, so it also contains pages to record expenses for equipment and supplies, set and catch information, and forms for landowner permission.

Research programs, both through the Wildlife Division and in cooperation with the University of Maine and the Maine Cooperative Fish & Wildlife Research Unit, are designed to answer specific management related problems and to further our knowledge of the biology and behavior of some of the highly secretive furbearers. Current research and management data indicate that recent harvests of most furbearer populations in Maine are well below maximum sustainable levels, and none are thought to be in danger of over harvesting. However, some species present special management concerns.

Beaver

Management of beaver is unusual among furbearers because, in addition to the demand for trapping opportunities, there is also a need to minimize conflicts with human activities caused by the beaver's tendency to build dams that flood roads, fields, or woodlots. Furthermore, in recent years, the value of beaver wetlands as habitat for a variety of wildlife species has become increasingly evident. Research has indicated that beaver wetlands change over time, beginning with newly flooded areas that contain high levels of nutrients and are very productive habitats for plants and wildlife. Productivity of these wetlands gradually declines, as does their value as habitat for ducks and other wildlife. A beaver colony may cause changes in the surrounding vegetation by selectively using hardwood species for food and building materials. When left alone, a beaver colony may eventually deplete its food supply, and beaver will move to another area. The old dam eventually breaks apart, draining the wetland. New vegetation sprouts, again attracting beaver, and the cycle begins again. This cycle is essential to maintain the productivity of wetland habitats.

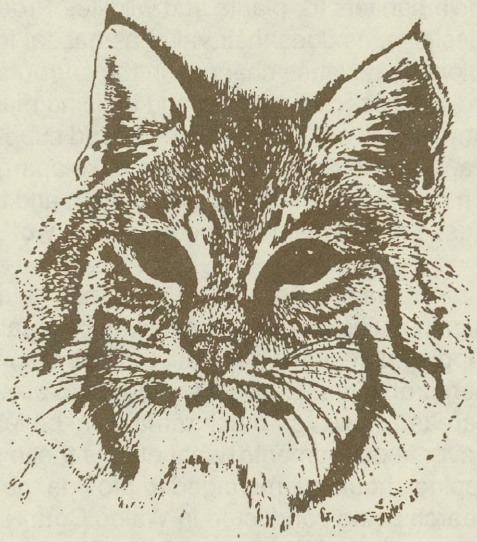
The system used for managing beaver in Maine may be used to replicate wetland cycling by manipulating beaver densities. Individual townships are opened to beaver trapping unless the population drops below a minimum level. Trapping is then prohibited for about two years to allow beaver to move in from surrounding areas. However, much remains to be learned about how changes occur in beaver impoundments, what effects these changes have on wildlife, and how trapping should be managed to provide the most benefit to wildlife habitat. Research being conducted in Waldo County by the University of Maine, in cooperation with the Wildlife Division's Furbearer and Gamebird Projects, is attempting to provide some of this information.

Bobcat

Bobcats are at the northern edge of their geographical range in western and northern Maine where they overlap with the southern edge of lynx range. Severe winter conditions can lower the survival of bobcats, because they have more specialized food habits than some predators and are not as well adapted as lynx to hunt in deep, powder snow conditions. Bobcat populations in some parts of Maine, therefore, often fluctuate with climatic conditions.

In 1987, the season for hunting bobcats was shortened by one month to halt a decline in the population. After three years of fairly stringent protection and mostly mild winters, the bobcat population seems to be slowly increasing. The 1989-90 harvest of bobcats by hunters was higher than the 1988-89 harvest due partly to good hunting conditions during December. Although the harvest by trappers declined in 1989-90, the number of active trappers declined even more, and the success rate of bobcat trappers increased. Additionally, people in many areas reported seeing an increase in bobcat tracks during the past winter. These are all indications that the bobcat population may be increasing.

Current plans are to maintain the present harvest level for several more years to allow the bobcat population to increase to more optimal levels. Additional efforts are being considered to more accurately monitor changes in bobcat populations throughout the state.



Fisher

Fishers have been studied intensively in Maine since the early 1980's. High pelt prices during much of this period and increasing development pressures occurring in southern and central Maine suggested the need for more intensive management efforts than had previously been undertaken. Recent MDIFW studies, conducted through the Maine Cooperative Fish and Wildlife Research Unit, documented survival and reproductive rates for fishers in Waldo County. This work suggests that fishers can sustain an annual harvest of approximately 25% without showing a decline. Low pelt prices during the past two years have resulted in harvests well below this level, but when prices were high (during the mid-1980's) harvests in management units 7 and 8 sometimes exceeded 30% of the estimated population. Trends in harvests, effort, and success rates of fisher trappers indicate fisher populations in southern and southcentral Maine may have declined from the mid-1970's through the 1980's.

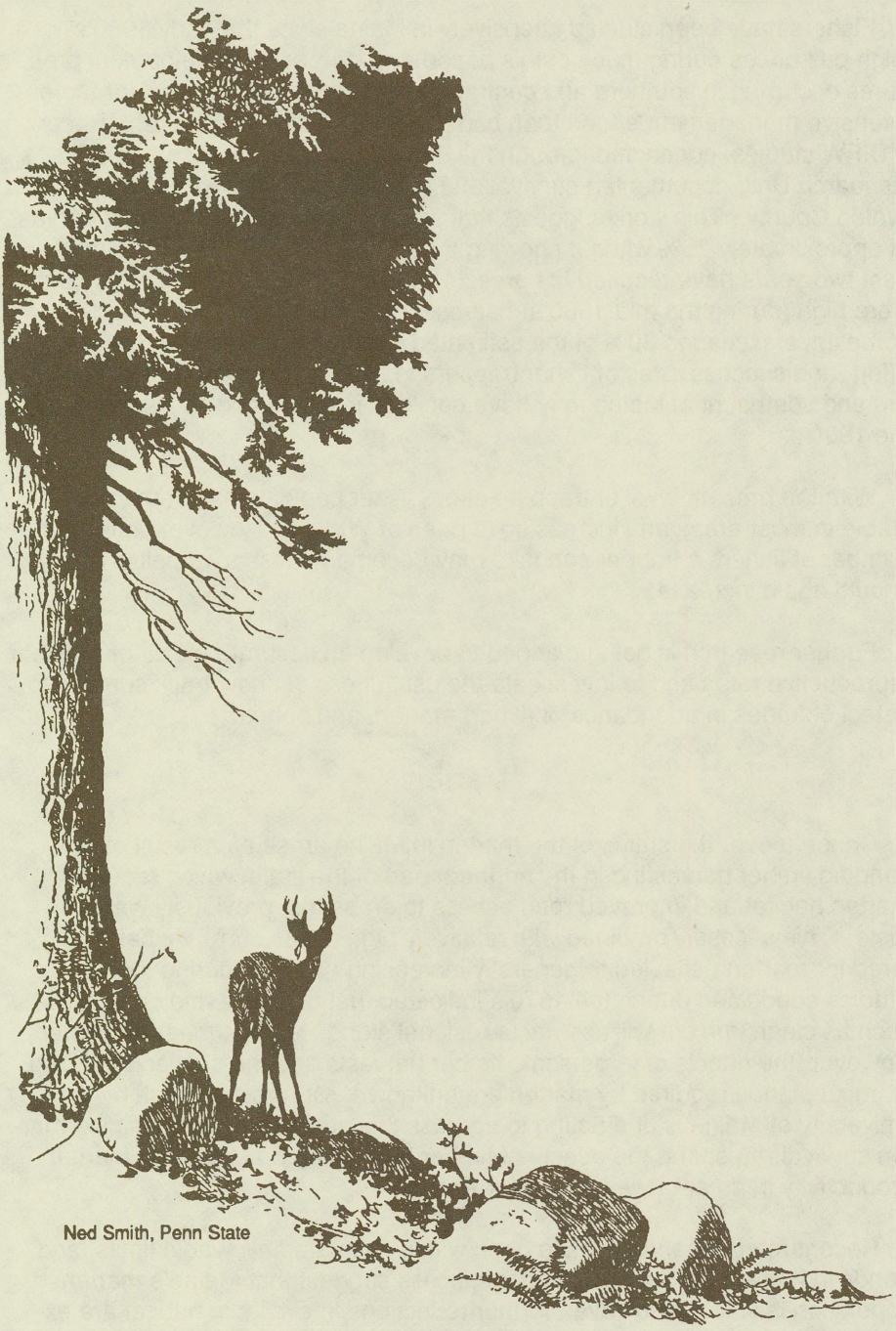
With the present level of trapping effort, fisher populations seem to be stable in most areas and increasing in parts of WMU 5. However, limiting the number of fishers a trapper can take may become necessary if pelt prices should again increase.

Further research is being planned to develop an accurate indicator of fisher reproductive rates and to investigate the usefulness of snow track surveys to detect changes in abundance of fisher, marten, and bobcat.

Marten

Concern over the status of the marten in Maine arose as a result of expanding timber harvesting in the northern part of the state, which reduced marten habitat and improved road access to areas that previously were remote. This access, combined with relatively high prices currently being offered for marten pelts, led to generally increasing harvests during the 1980's. Studies conducted during the 1970's indicated that marten avoid open areas, such as clearcuts, but will use uncut residual stands left by timber harvesters. However, the effects of large-scale timber harvests and the size and spacing of uncut stands required by marten are unknown. Current research by the University of Maine is attempting to address this question by determining marten survival rates, and the effects of timber harvesting practices, on marten productivity in an area west of Baxter Park.

Recent marten harvests have been within estimated allowable limits, and trends in harvest, effort, and trapper success suggest that Maine's marten population is stable. However, further reductions in available habitat are expected to occur, and interest in trapping marten is expected to remain high. Restricting marten harvests by limiting the number of marten a trapper can take may be necessary to prevent a decline in coming years.



Ned Smith, Penn State

CERVIDS

CARIBOU REINTRODUCTION

In 1986, the Maine Caribou Transplant Corporation (MCTC) was formed to privately finance an experimental reintroduction of caribou from Newfoundland to Maine. Since then, MDIFW has been indirectly involved, because its responsibilities include approving such reintroductions. Once the caribou are released, they come under the jurisdiction and protection of MDIFW ($10,000 fine for killing a caribou). MCTC is responsible for the caribou reintroduction experiment, including post-release monitoring. In 1993, MDIFW will assume total responsibility for all released caribou.

MDIFW biologists have closely followed the experiment since 1986. Concerns about bringing a new parasite *(Elaphostrongylus cervi)* from Newfoundland into Maine have been addressed through intensive treatment and testing of each caribou before release. In addition, our biologists provided technical advice for radio-collaring caribou and development of the monitoring program. The **primary goal** of the monitoring program is to determine the fate of each caribou released into the wild. Caribou that die will be recovered and examined to determine cause of death. Also, movements of caribou will be closely monitored to determine how far they move and what habitats they prefer.

In April 1989, 12 captive-born caribou (1 and 2 years old) were released into Baxter State Park. Ten of the caribou died by November 1989; one caribou lost its radio collar; and, the last collared caribou was recaptured in December 1989 and returned to the nursery herd at Orono. Caribou mortalities in 1989 were primarily the result of deer brainworm *(Parelaphostrongylus tenuis)* and/or predation. It was suspected that some of the caribou released in 1989 were infected with brainworm while in the pens at Orono.

A change in project strategy was implemented in 1990: release the Orono nursery herd (20 caribou - 15 brought from Newfoundland in 1986, 5 captive-born) in April, and transport additional caribou from Newfoundland for release in the fall. Further releases of caribou from Newfoundland are planned for 1991 and 1992. Continuation of the project will be based on annual reviews of the experiment's progress by MDIFW and the Newfoundland Wildlife Division.

Anyone interested in this effort can write to the Maine Caribou Transplant Corp., 240 Nutting Hall, University of Maine, Orono, ME 04469.

MOOSE

1989 Moose Season

In 1989, 922 moose hunting permit holders, or their subpermittees, harvested a moose in Maine. This success rate (92%) was only 1% less than 1989, which was the highest of any modern day moose season. Northeastern, Central, Southwestern, and Southcentral zones have had success rates above 90% for the last 3 seasons. The Southeastern zone has had steadily increasing success since the zone was expanded to include an area south of the Canadian Pacific tracks. As usual, the Northwestern zone had the lowest hunter success although it exceeded 80% in the last 2 years (Table C1, Figure C1).

Composition of the kill (Table C2) is similar to past years, but it does not represent the structure of the herd. Small numbers of calves, and the preponderance of males among yearlings and adults, are due to hunters choosing to shoot specific types of moose (principally adult bulls).

Changes and Prospects for the 1990 Season

The next season will be similar to recent seasons with 1,000 permits allocated at the same rate among the same 6 zones used since 1986 (Figure C1). However, this year the season was moved to September 24th - 29th by the Commissioner and his Advisory Council. September seasons were held from 1980 to 1983, and the 1984 season was held in mid-October. The last 5 seasons have been in late October.

At our current conservative rate of harvest, the timing of the season is of little consequence to the condition of the moose herd. Season timing is primarily an issue from the hunter's viewpoint. Consequently, season dates can and have been selected for social rather than biological reasons. Unfortunately, people who would like to hunt moose are not all of the same mind when season dates are concerned!

September seasons fall early in the rut (breeding period) when bulls are at peak weight (See Table C3). Their meat quality is considered by some persons to be better than in October. At this time, mature bulls respond readily to a moose call. However, the weather can be hot, making it harder to get the carcass out of the woods and cooled down before it spoils. Leaves on trees also reduce the visibility of moose in September. In 1980, the first moose season was held in late September so that all other hunting could be stopped with a minimal loss of hunting opportunity. The season was moved into October after 1983 based on hunter requests for a season in cooler weather.

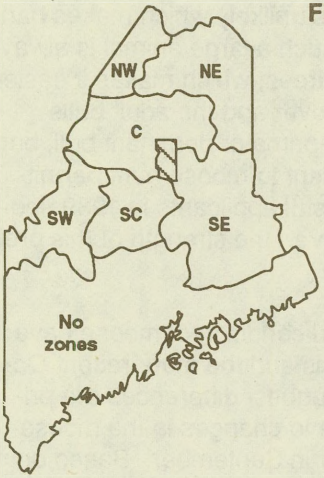


Figure C1. Maine moose hunting zones, 1989.

NW	Northwestern Zone	100 permits
SW	Southwestern Zone	120 permits
NE	Northeastern Zone	220 permits
SC	Southcentral Zone	120 permits
C	Central Zone	290 permits
SE	Southeastern Zone	150 permits

Table C1. Percent of permittees who registered a moose by zone and season.1

	Moose Hunt Zone						
Season	**NW**	**NE**	**CE**	**SE**	**SC**	**SW**	**ALL**
1980 (9/22-27)			**No zones**				91
1982 (9/20-25)			**Not registered by zones**				88
1983 (9/19-24)	57	66	78	65	95	92	74
1984 (10/8-13)	67	78	82	83	94	91	82
1985 (10/21-26)	**73**	**86**	**89**	86	98	98	88
1986[2](10/20-25)	**65**	**85**	**90**	**72**	**100**	**91**	**86**
1987 (10/18-23)	**64**	**90**	**96**	**78**	**98**	**98**	**89**
1988 (10/17-22)	**84**	**93**	**92**	**82**	**98**	**100**	**93**
1989 (10/16-21)	**82**	**95**	**93**	**85**	**99**	**97**	**92**

[1]Boldface numbers indicate seasons in which hunting regulations and conditions were comparable within each zone.
[2]Area open to hunting expanded in three southern zones.

Table C2. 1989 Moose harvest by zone (1000 permits issued).

Sex/Age	**NW**	**NE**	**CE**	**SE**	**SC**	**SW**	**ALL**
Male calf	0	2	1	4	1	1	9
Female calf	5	3	5	5	1	1	20
Male yearling	7	23	28	14	9	7	88
Female yearling	2	5	7	7	3	3	27
Male adult	37	118	150	64	74	77	520
Female adult	31	58	78	33	31	27	258
Total	**82**	**209**	**269**	**127**	**119**	**116**	**922**

By mid to late October, extremely hot weather is unlikely which makes handling the carcass easier (although the carcass of such a large animal is always a challenge to cool down). The leaves are off the trees, which makes it easier to spot a moose. However, the rut is pretty much over and the adult bulls have become extremely lean. It is harder to call a prime or dominant bull, but younger bulls can still be called. Questionnaires sent to moose hunt permittees in 1988 and 1989, and a sample of unsuccessful applicants in 1989, indicated a preference for the October season. However, the strength of this preference was not mentioned.

Since 1980, several differences in sex, age, and condition of moose have been noted between the earlier September seasons and the more recent October seasons. These relatively abrupt changes suggest differences are primarily due to season timing, but some may be due to changes in the moose population. In general, we expect bulls to be fatter in September. Based on past experience, a September harvest will likely have a slightly higher proportion of bulls to cows compared to October seasons (Table C3). Bulls shot in September are also likely to be a little older, with more bulls over 5 years old (the age class most likely to produce trophy animals). Relatively few yearling bulls are harvested in September.

The effect season timing has on hunter success is open to speculation. September seasons in 1982-83 (with zones) had 74 and 88% success, respectively. Success in late October seasons ranged from 86 to 93%. Sighting rates of 1.1 and 1.7 moose per 10 hours of hunting were reported in September seasons and from 2.2 to 3.8 from 1985 to 1988 during October seasons (when no leaves were on trees). Hunter success and moose sighting rates in 1982 and 1983 suggest that hunter success in September seasons should be expected to vary with weather and the peak activity period of the rut. The low

Table C3. Comparison of weights of fully grown moose (over 5 yrs. old) and harvest composition between September and October seasons.

Season	Mean Weight		Adult[1] bulls/100	Bull Harvest	
	Cows	Bulls	adult cows	% yearlings	% over 5 years
1980 (9/22-27)	590	875	273	12	41
1982 (9/20-25)	540	845	282	17	48
1983 (9/19-24)	570	825	248	19	44
1984 (10/8-13)	590	785	243	17	32
1985 (10/21-26)	n/a	n/a	169	18	n/a
1986 (10/20-25)	580	765	170	27	23
1987 (10/18-23)	590	760	176	22	23
1988 (10/17-22)	605	760	220	24	26
1989 (11/16-21)	610	725	213	16	33

[1]Adult = > one year old.

success and sighting rate in 1983 was believed to be a result of very warm weather early in the season, combined with the fact that bulls had apparently not begun to rut in earnest.

The extent that differences in hunter success and moose sightings reflect changes in moose behavior and/or leaf fall, and how much they reflect an increasing moose population, is not known. To detect changes in moose populations requires stable season timing over a number of years. Continued high success, and increases in sightings during the late October seasons, suggest that the moose population increased slightly during the late 1980's.

Future Management

Moose-vehicle accidents

The number of moose-vehicle accidents has been increasing and there appear to be 3 reasons for this: 1) moose have become more abundant; 2) there is more traffic; and 3)in some cases rural roads have been improved allowing motorists to drive faster. U.S. Route 201, between Bingham and the Canadian border, is well known for moose/vehicle accidents. Portions of this highway are being used to test potential means of reducing accidents. Standard yellow diamond warning signs with "MOOSE CROSSING" on them appear to have little effect on driver behavior or accident rate.

In late summer and early fall of 1989, we tested "Big Game Repellant" (BGR) to see if it would make salty pools near the road less attractive to moose and reduce moose activity along the road. Because moose activity declined for 1 week on both sprayed and unsprayed areas, the results were inconclusive but suggested that any effect may be slight and short lived.

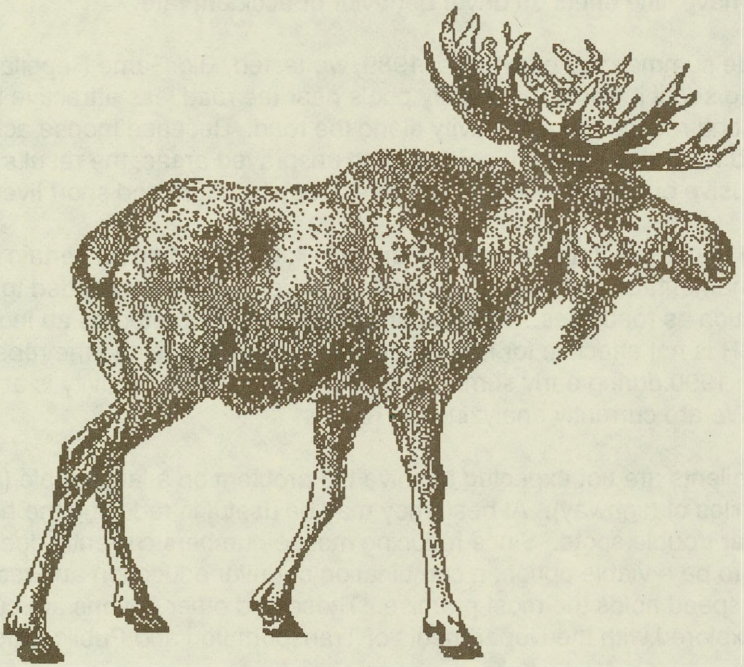
BGR is manufactured to repel deer and elk from feeding on certain conifers, ornamentals, and fruit, citrus or almond trees; it is not intended to treat areas such as roadsides. This test should not be interpreted as an indication that BGR is not effective for its intended purposes. We tested the repellent again in 1990 during early summer when moose roadside activity is at its peak. We are currently analyzing the results.

Repellents are not expected to solve the problem on a large scale (i.e., along miles of highway). At best, they may be useful in reducing the hazard at particular trouble spots. Since reducing moose numbers currently does not appear to be a viable option, a combination of driver education and reduced vehicle speed holds the most promise. These and other options are currently being explored with the Departments of Transportation and Public Safety.

Census testing

Aerial censuses in Maine have been of limited value because of wide variations in moose densities and the difficulty in estimating how many moose are not seen during a census because of dense cover. To address these problems, we flew several censuses at different flight intensities during 1988-89, in areas known to have radio-collared moose, so we could determine what proportion of the moose were not seen.

Last winter (1989-90), the Department conducted a test census on 700 mi^2 west of Baxter Park using the results of the 1988-89 flights. We determined moose can be censused in non-mountainous parts of northern Maine, but costs will be high. Department biologists are currently evaluating the potential use of this technique for moose management in Maine.

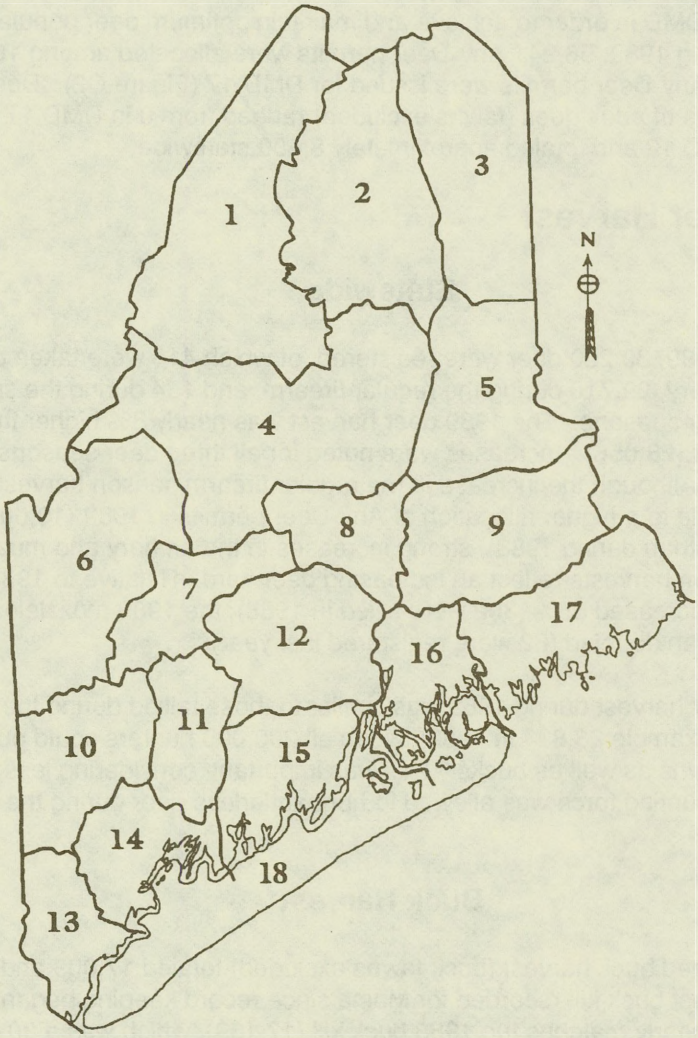


WHITE-TAILED DEER

1989 Deer Season

Hunters in Maine could pursue deer a total of 55 hunting days during 1989. During the special archery season (24 days, October 2-27), archers could hunt deer of either sex. The regular firearm season, which began for residents on

Figure C2. Location of Deer Management Districts (new District 18 is described on page 33).



October 28 and for all hunters the following Monday (October 30), ended for all hunters on November 25 (25 hunting days). Black powder enthusiasts had 6 more days to pursue white-tails during the special muzzleloader season (November 27 to December 2). Deer could not be hunted on Sunday, and the limit on deer remained the same—1 deer per hunter per year.

During the regular firearm and special muzzleloader seasons, hunters could harvest a buck (a deer with antlers at least 3 inches in length) anywhere in Maine. Those that possessed an Any-Deer permit could choose to take a doe or fawn instead, but only within a specific Deer Management District (DMD; Figure C2).

The Any-Deer permit system is designed to regulate harvests of does within each DMD in order to achieve and maintain optimum deer population levels. During 1989, 56,241 Any-Deer permits were allocated among 16 DMDs. No Any-Deer permits were issued for DMD 17 (Figure C2). Desired harvest levels of adult does (fawns excluded) ranged from 0 in DMD 17 to 1,800 in DMD 12 and totaled approximately 8,400 statewide.

1989 Deer Harvest

Statewide

During 1989, 30,260 deer were registered, of which 416 were taken during special archery, 29,710 during the regular firearm, and 134 during the special muzzleloader seasons. The 1989 deer harvest was nearly 8% higher than the 1988 harvest (28,056). Increases were noted for all three deer seasons (Table C4). Although the increase in the regular firearm season harvest may be attributable to a higher allocation of Any-Deer permits in 1989 (10,000 more were issued than during 1988), strong increases in the archery and muzzleloader season harvests reflect an increasing deer herd. Relative to 1988, the archery kill increased 38% (302 were killed in 1988); the 1989 muzzleloader take more than doubled (62 were registered last year).

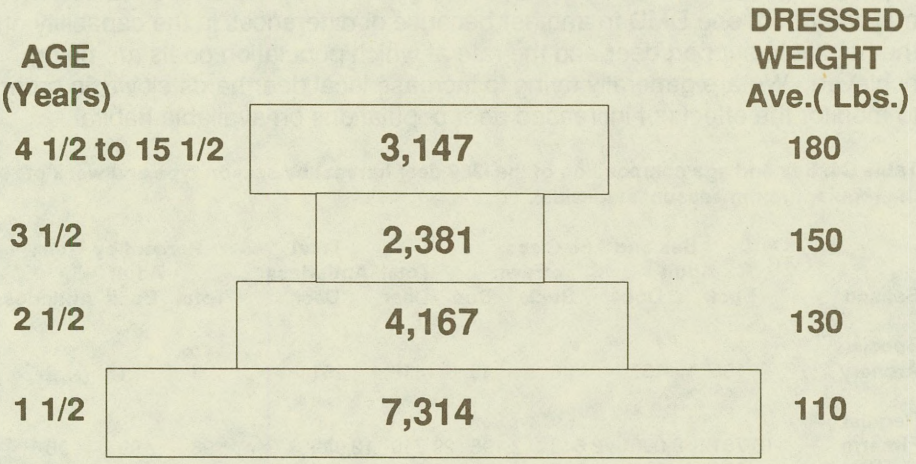
Total deer harvest during 1989 was similar to those tallied during the early 1980's (for example 28,834 in 1982), when all 200,000 hunters could pursue does and fawns as well as bucks. This was important, considering less than 25% of the hunting force was allowed to hunt antlerless deer during the 1989 season.

Buck Harvest

The antlered buck harvest (buck fawns excluded) totaled 17,009 and was the 6th highest buck kill recorded for Maine since record keeping began in 1919. This nearly matches the 1988 buck kill (17,139), which was a 30-year high for buck harvests in Maine (the 1959 buck kill was 17,154)! Since the

deer herd began increasing in response to antlerless deer harvest restrictions and favorable winters, the buck kill has gradually increased by 34% over 6 or 7 years. During the five final years of either-sex hunting in Maine (1978-82), the buck harvest averaged 12,813.

Figure C3. Distribution of the 1989 harvest of antlered bucks by age class and dressed weight.



Some hunters believe the increased buck harvest is the result of heavier exploitation of bucks. While it is possible bucks-only and Any-Deer permit hunting could focus extra hunting pressure on bucks, available data do not support this theory.

The composition of the 1989 antlered buck harvest (Figure C3) differed slightly from 1988 in that proportionately more yearling bucks, and slightly fewer mature bucks, appeared in the 1989 harvest. During 1989, yearlings comprised 44% of the buck harvest (compared to 39% in 1988), while mature (> 4 years old) bucks accounted for 19% (compared to 23% in 1988). This slight shift toward younger bucks may be attributable to an increase in survival of young bucks during the mild 1988-89 winter. Greatest increases in yearling bucks appeared in the central and southern DMD's (Figure C2) where very mild wintering conditions prevailed. In addition, the record warm (70's) hunting weather which prevailed during the first 2 weeks of the regular firearm season in 1989 may have reduced movements by mature bucks prior to the rut. Harvest rates of mature bucks during the latter 2 weeks of the gun season appeared normal. Although young (and inexperienced) bucks were harvested at normal rates during the early part of the gun season, mature bucks were noticeably fewer.

Antlerless Harvest

Any-Deer permits (56,241) issued during 1989 resulted in an adult doe harvest (8,292 statewide) within 2% of the desired quota of 8,400 does. Doe harvests varied by less than 5% of the desired quota in 6 of the 16 DMDs that had a quota. Elsewhere, doe harvests missed desired quotas by 7 to 21%; most were below the quota.

Hunting pressure on does and fawns has been reduced to allow the herd to expand within all DMDs. However, the degree to which does are protected may vary from one DMD to another because of differences in the capability of the habitat to support deer and the rate at which population goals are being achieved. We are generally trying to increase local deer herds slowly in order to monitor the effects of increased deer populations on available habitat.

Table C4. Sex and age composition of the 1989 deer harvest by season type and week of the regular firearm season, statewide[1].

	Sex and Age Class						Percent by Week		
	Adult		Fawn		Total	Total Antlerless	Adult		
Season	Buck	Doe	Buck	Doe	Deer	Deer	Total	Buck	Antlerless
Special Archery	165	157	46	48	416	251	1	1	2
Regular Firearm	16,781	8,090	2,643	2,196	29,710	12,929	98	99	98
Opening Sat.	1,396	694	227	199	2,516	1,120	8	8	8
Oct. 30-Nov. 4	3,587	1,898	629	517	6,631	3,044	22	21	23
Nov. 6-11	3,512	1,460	496	399	5,867	2,355	19	21	18
Nov. 13-18	3,905	1,292	473	339	6,009	2,104	20	23	16
Nov. 20-25	4,381	2,746	818	742	8,687	4,306	29	26	32
Special Muzzleloader	63	45	12	14	134	71	< 1	< 1	< 1
Total	17,009	8,292	2,701	2,258	30,260	13,251	100	100	100

1Sex/age data were corrected for errors evident in the deer registrations.

Statewide, 4,959 fawns of both sexes were registered by holders of Any-Deer permits during 1989. Interestingly, hunters seem to be selecting against harvesting fawns. Under past either-sex hunts, the fawn harvest nearly equalled (and sometimes exceeded) the adult doe kill. However, since 1986, the fawn harvest has dropped to 55-60% of the doe harvest. Similar declines in the relative harvest of fawns have been noted in several other states that utilize "doe permits". Declines in the harvest rate of fawns are related to hunter behavior and do not reflect real declines in actual fawn abundance. Actually, reducing the harvest rate of fawns benefits all hunters by allowing a higher number of males to become available in subsequent years as antlered bucks. In addition, more females are also recruited into the adult doe population, potentially boosting future fawn production.

Harvest by Week

A four-week regular firearm season with unified opening and closing dates statewide was first implemented in 1984. This season structure, combined with the Any-Deer permit system for doe harvest (first implemented in 1986) was designed to reduce unnecessary hunter movement between DMDs, as well as reduce the intense hunting pressure experienced during certain days of past hunts, including either-sex and bucks-only hunts. Hunter shifts and unregulated hunting pressure are undesirable, because they result in unpredictable doe harvests that may contribute to herd declines.

The current season structure has also been successful in distributing hunting effort more evenly throughout the season (Table C4). Buck and antlerless deer harvests were similar during all but the final week of gun season. Opening Saturday (for residents) accounted for 8% of the total harvest. The buck harvest was remarkably similar between weeks. Doe and fawn harvests declined slightly during each succeeding week until the final 6 days, when Any-Deer permit holders "cashed in" during the Thanksgiving holiday week.

This weekly kill pattern was similar to the 1986 to 1988 seasons but stands in sharp contrast to past either-sex hunts. During the early 1980's, the 3-week either-sex hunts in the southern half of the state encouraged intense hunting pressure early in the season. Opening Saturday typically accounted for 15% of the harvest, and 35 to 40% of the kill occurred during opening week. At least half of the harvest occurred during the opening 7 days of those 19-day hunts. Does and fawns comprised a large portion of the harvest during the early part of the season. Bucks made up a higher proportion of the kill during subsequent weeks, unless there was a good tracking snow. When snow fell, usually late in the season, the antlerless deer kill would substantially increase, often to the detriment of the herd. As noted in the previous section, the Any-Deer permit system has markedly reduced such extreme fluctuations in the doe harvest and has provided a great deal of predictability in achieving harvest levels necessary to manage the herd.

Harvest by DMD

Differences in doe and fawn harvests among DMDs largely stemmed from differences in Any-Deer permit allocations (Table C5). Although antlered buck harvests may be influenced to some degree by regional differences in hunting pressure and weather, the size of the buck kill per sq. mi. roughly reflects the relative abundance of deer in the DMDs.

Highest buck kills occurred in central and south-coastal DMDs (Figure C2; Table C5). Northern and east-coastal DMDs had considerably lower buck kills and deer numbers.

Table C5. Sex and age composition of the 1989 deer harvest by Deer Management District[1].

DMD	Sex/Age Class: Adult Buck	Adult Doe	Fawn Buck	Fawn Doe	Total Deer	Total Antlerless Deer	Adult Does Per 100 Adult Bucks	Bucks Per Mi² Habitat	Deer Per Mi² Habitat
1	998	199	78	52	1,327	329	20	0.28	0.37
2	756	172	43	40	1,011	255	23	0.28	0.38
3	407	92	40	26	565	158	23	0.18	0.25
4	1,236	514	160	144	2,054	818	42	0.35	0.59
5	979	612	186	177	1,954	975	63	0.55	1.10
6	820	280	97	68	1,265	445	34	0.32	0.50
7	904	500	192	159	1,755	851	55	1.08	2.10
8	1,145	854	303	243	2,545	1,400	75	1.16	2.57
9	604	241	67	59	971	367	40	0.33	0.53
10	1,241	528	165	139	2,073	832	43	0.79	1.32
11	796	348	119	100	1,363	567	44	1.03	1.76
12	2,665	1,736	609	496	5,506	2,841	65	1.42	2.94
13	1,274	729	203	180	2,386	1,112	57	1.28	2.40
14	1,048	685	221	183	2,137	1,089	65	1.54	3.15
15	1,143	584	156	146	2,029	886	51	1.07	1.89
16	505	204	52	43	804	299	40	0.64	1.02
17	488	14	10	3	515	27	3	0.28	0.30
Statewide	17,009	8,292	2,701	2,258	30,260	13,251	49	0.58	1.03
Percent	56	27	9	8	100	44			

1Sex/age data were corrected for errors in the deer registrations.

Harvest by Hunter Residency

Maine residents claimed the lion's share (80%) of the 1989 deer harvest (Table C6). As has occurred during the past several decades, nonresidents registered about one fifth of the total kill while accounting for roughly 15% of the deer license sales.

Regional differences occurred in the distribution of the harvest by residents and visitors to Maine (Table C6). Most of the successful deer hunters in the more populous central and southern DMDs were residents, but nonresidents accounted for a much larger share of the harvest in northern and western DMDs (Figure C2, Table C6).

A substantial number of Maine residents travelled to hunting areas outside of their home DMD. Many hunters pursued deer in two or more DMDs, including their home district. Typically, 25% of the statewide deer harvest is registered by residents who travelled to another DMD. Regionally, as little as 10% (DMD 14) to as much as 50% (DMD 2) of the harvest was taken by Maine residents who hunted away from their home DMD.

Hunter Participation and Success Rate

During 1989, nearly 247,000 licenses which permit deer hunting were sold in Maine; 83% were bought by residents. License sales increased by nearly 10% compared to 1988, and established an all-time record for Maine.

Not all hunters who purchase big game (non-residents) or general (residents) hunting licenses actually pursue deer. According to recent (1989) and past surveys (1970-84), approximately 15% of these license buyers chose not to deer hunt. When these hunters are subtracted from total hunting license sales, the estimated number of hunters who actually hunted deer in 1989 was approximately 210,000. Of this total, 174,000 were residents and 36,000 were nonresidents.

Among archers, 8,233 residents and 1,177 nonresidents bought licenses which allowed them to hunt during the special archery season. The 9,410 archery licenses sold represent a 9% decrease from 1988 sales. This was probably due to implementation of mandatory archery training before purchase of the first license. During the past 6 seasons, however, archery license sales have nearly doubled, reflecting a trend toward greater participation in the sport of bowhunting deer. No doubt, the fact that archers could still bowhunt deer of either sex may have drawn many new recruits from the ranks of firearm hunters. Even at current bow harvest levels (300-400 deer statewide annually), archery hunting exerts a minor biological impact on local deer populations.

Table C6. Deer registrations by Deer Management District and hunter residence, 1989.

	Deer Registered by:						
	Residents		Nonresidents		Total	Total	Percent
DMD	No.	%	No.	%	1989	1988	Change
1	476	36	851	64	1,327	1,124	18
2	526	52	485	48	1,011	1,073	-6
3	486	86	79	14	565	506	12
4	1,277	62	777	38	2,054	1,847	11
5	1,439	74	515	26	1,954	1,961	<1
6	891	70	374	30	1,265	1,096	15
7	1,352	77	403	23	1,755	1,548	13
8	2,051	81	494	19	2,545	2,443	4
9	768	79	203	21	971	1,083	-10
10	1,853	89	220	11	2,073	1,605	29
11	1,277	94	86	6	1,363	1,275	7
12	4,762	86	744	14	5,506	5,427	1
13	2,088	88	298	12	2,386	1,980	21
14	2,076	97	61	3	2,137	1,676	28
15	1,833	90	196	10	2,029	2,124	-4
16	722	90	82	10	804	850	-5
17	451	88	64	12	515	438	18
State-wide	24,328	80	5,932	20	30,260	28,056	8

Sales of muzzleloading hunting permits was 2,161 during 1989, 95% of which were purchased by residents. Participation in Maine's black powder hunts has quadrupled since the first hunt in 1981. As with archery hunting, the impact of this season on the deer herd has been negligible. Muzzleloader hunters must also comply with Any-Deer permit regulations.

Hunter success averaged 14.4% among regular firearm hunters during 1989. Success rate for nonresidents (16.3%) was slightly higher than for residents (14.0%) during the regular firearm season. Success rate for holders of Any-Deer permits was considerably higher (32%) than for hunters restricted to bucks only (8.1%), since permittees could harvest either a doe, fawn, or buck. Only 4.4% of archery hunters and 6.2% of the muzzleloader hunters, were successful.

Current Deer Population Status

Since 1983, herds in most DMDs have increased in response to doe harvest restrictions and some rather mild winters. The estimated post-hunt herd has increased from roughly 160,000 deer prior to 1983 to nearly 250,000 deer during 1989. Currently, the herd remains in balance with available food supply. Although within a few DMDs, deer populations are approaching desired levels, habitat in all DMDs is sufficient to support more deer. These increases may be accomplished while maintaining quality deer, if winters remain mild to moderate in severity.

Recent estimates suggest a population of 300,000 deer can be maintained in good condition in Maine. To achieve this level, population objectives have been set for individual DMDs. These objectives, along with current winter severity patterns, will continue to guide decisions concerning allocation of Any-Deer permits during 1990 and subsequent years.

Prospects For The 1990 Season

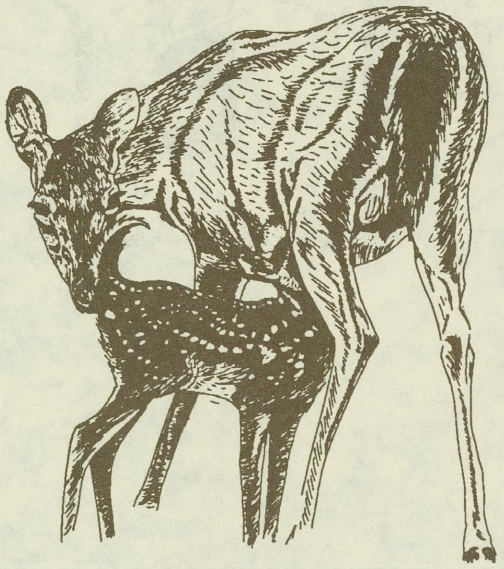
Season structure will remain similar to 1989. Allocation of Any-Deer permits during 1990 is approximately 46,500, about 10,000 fewer than 1989's allocation. Population objectives for each of Maine's 17 Deer Management Districts have not yet been attained; consequently doe harvests will remain conservative. In addition, the 1990 winter was more severe than normal in central, eastern, and northern DMDs. Above-average winter losses in DMDs 1-9, 12, and 16 will be offset by a 20 to 50% reduction in Any-Deer permits during 1990, relative to 1989 allocations. In DMD 17, no Any-Deer permits will be allocated again in 1990 in order to encourage a recovery of the downeast deer herd.

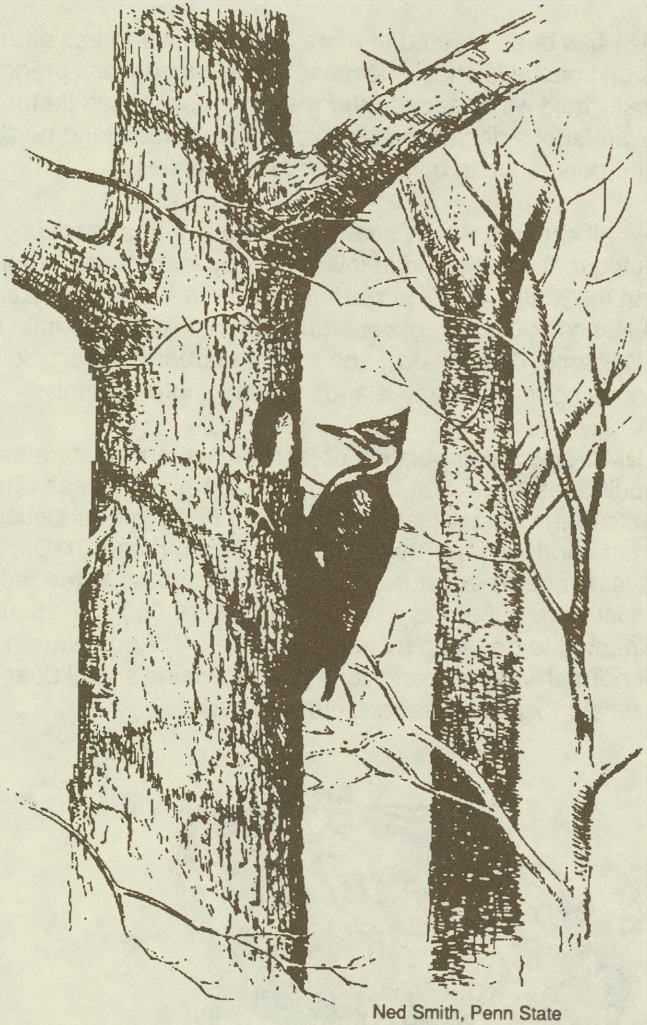
In southern and midcoastal sections (DMDs 10, 11, 13, 14, and 15), more favorable wintering conditions prevailed. This, coupled with recent increases in local deer populations, requires a 2-20% increase in Any-Deer permits to maintain slow and controlled deer population growth.

A new DMD (#18) has been created to more adequately address deer management concerns on coastal islands. Because these islands lack predators, are subject to typically mild winters, and offer marginal quality habitat for deer, they require higher antlerless deer harvests than adjacent mainland herds in order to maintain the population in balance with food supplies.

DMD 18 includes all coastal islands seaward of the first upstream bridge that are not connected to the mainland at low tide or by man-made structures, and that lie between the Maine-New Hampshire border in York County and Frenchman Bay in Hancock County, except those islands located within the towns of Sullivan, Sorrento, Gouldsboro, and Winter Harbor in Hancock County. DMD 18 does not include any islands in Washington County.

To accomplish DMD-specific population objectives, we anticipate a harvest of roughly 7,000 adult does and 4,200 fawns by Any-Deer permittees (and archers). The effects of the past winter should be felt in a slight reduction in the buck harvest in the northern two-thirds of the state. In those DMDs, fewer yearlings, and to a lesser degree mature bucks, should appear in the registered kill in 1990, relative to 1989. As a whole, roughly 16,000 to 16,500 antlered bucks are expected to be taken by hunters in 1990 (17,009 were harvested in 1989). If normal weather conditions prevail, Maine's total deer harvest should approximate 27,500 white-tails during 1990.





Ned Smith, Penn State

ENDANGERED AND NONGAME WILDLIFE

In 1984, the Endangered and Nongame Wildlife Project was established by the Department to coordinate the development of rare, endangered, and nongame wildlife conservation programs. Since its establishment, the project has focused on three primary areas of effort: natural history surveys, species recovery, and public service and education.

NATURAL HISTORY SURVEYS

There are about 450 species of nongame vertebrates in Maine, including some very rare and endangered species (Table NG1). An understanding of the status and management needs of these little understood species is being pieced together through a wide range of surveys, inventories, and research projects. Results include: rediscovery of the threatened northern bog lemming in Maine after 80 years, finding several ponds containing the threatened blanding's turtle, and discovery of nesting golden eagles in Maine. More than 25 grants and contracts have been awarded for natural history surveys of dozens of species.

SPECIES RECOVERY PROJECTS

Some of Maine's rare and endangered species need intensive management to prevent their loss from Maine or to increase populations to secure levels. Management programs are now operational for the bald eagle, peregrine falcon, piping plover, and least tern, and are being developed for other species.

PUBLIC SERVICE AND EDUCATION

Interest in Maine's endangered and nongame species is large and growing. Each year, MDIFW biologists give nearly 100 talks and slide shows to clubs, groups, and schools. They also participate in many radio and television shows about wildlife and lead numerous public field trips and training workshops. Additionally, more than a dozen new publications have been produced for the public, and hundreds of requests for information have been answered. Nine grant awards were also given in 1987 to support projects of educational value to wildlife.

Table NG1. Maine Rare and Endangered Species

I. Maine Endangered Species: Species in immediate danger of extirpation (extermination).

1. Bald Eagle*
2. Peregrine Falcon*
3. Golden Eagle
4. Piping Plover**
5. Least Tern
6. Roseate Tern*
7. Sedge Wren
8. Grasshopper Sparrow
9. Right Whale*
10. Humpback Whale*
11. Finback Whale*
12. Sperm Whale*
13. Sei Whale*
14. Leatherback Turtle*
15. Atlantic Ridley Turtle*
16. Box Turtle
17. Black Racer

*Federally listed Endangered Species **Federally listed Threatened Species

II. Maine Threatened Species: Species that will become endangered if current populations experience further decline.

1. Tundra Peregrine Falcon*
2. Northern Bog Lemming
3. Loggerhead Turtle*
4. Blanding's Turtle
5. Spotted Turtle

*Federally listed Threatened Species

III. Maine Special Concern Species: Species particularly vulnerable to population decline due to restricted distribution and/or habitat loss.

1. Harlequin Duck
2. Common Tern
3. Arctic Tern
4. Water Pipit
5. New England Cottontail
6. Ribbon Snake
7. Landlocked Arctic Charr

IV. Maine Species of Indeterminate Status: Indigenous wildlife believed to be of endangered, threatened, or special concern status, but about which insufficient data are available.

1. Least Bittern
2. Upland Sandpiper
3. Black-crowned Night Heron
4. Horned Lark
5. Orchard Oriole
6. Southern Flying Squirrel
7. Yellow-nosed Vole
8. Red Bat
9. Hoary Bat
10. Silver-haired Bat
11. Big Brown Bat
12. Little Brown Myotis
13. Keen's Myotis
14. Small-footed Myotis
15. Eastern Pipistrelle
16. Tremblay's Salamander
17. Wood Turtle
18. Brown Snake
19. Swamp Darter
20. Brook Stickleback
21. Grass Pickerel
22. Lynx

V. Maine Watch List: Species that do not meet the rigorous requirements of inclusion in Categories I through IV, but do warrant special attention.

1. Leach's Storm-Petrel
2. Snowy Egret
3. Little Blue Heron
4. Tricolored Heron
5. Cattle Egret
6. Glossy Ibis
7. American Black Duck
8. Barrow's Goldeneye
9. Cooper's Hawk
10. Red-shouldered Hawk
11. Semipalmated Plover
12. Black-bellied Plover
13. Ruddy Turnstone
14. Whimbrel
15. Greater Yellowlegs
16. Lesser Yellowlegs
17. White-rumped Sandpiper
18. Least Sandpiper
19. Dunlin
20. Short-billed Dowitcher
21. Semipalmated Sandpiper
22. Sanderling
23. Red-necked Phalarope
24. Bonaparte's Gull
25. Black Tern
26. Razorbill
27. Atlantic Puffin
28. Eastern Bluebird
29. Vesper Sparrow
30. Sharp-tailed Sparrow
31. Southern Bog Lemming
32. Long-tailed Shrew

VI. Maine Extirpated Species: Species of wildlife that were once indigenous to Maine but have not been documented as indigenous for the past 50 years.

1. Labrador Duck (extinct)
2. Eastern Anatum Peregrine
3. Eskimo Curlew
4. Great Auk (extinct)
5. Passenger Pigeon (extinct)
6. Loggerhead Shrike
7. Sea Mink (extinct)
8. Gray Wolf
9. Woodland Caribou
10. Eastern Cougar
11. Timber Rattlesnake

Table NG2. A history of the Maine Endangered and Nongame Wildlife Fund.

Year	Total Given	Number of Givers	Average Donation	Percent of Taxpayers Giving
1984	$115,794	25,322	$4.57	5.34%
1985	$129,122	29,200	$4.42	5.96%
1986	$112,319	26,904	$4.17	5.41%
1987	$114,353	26,554	$4.31	5.19%
1988	$104,000	25,090	$4.00	4.75%

The core source of funding for much of this work is the voluntary tax checkoff for endangered and nongame wildlife, nicknamed the "Chickadee Checkoff", on the Maine income tax form. The Chickadee Checkoff has received tremendous support. More than $100,000 has been donated each year through 1988 (Table NG2). This money has been essential to the conservation of rare and endangered wildlife in Maine.

The following pages provide more detailed summaries on several MDIFW projects currently underway for endangered or nongame wildlife.

RARE AND ENDANGERED SPECIES LISTING

In 1975, the State Legislature passed the Maine Endangered Species Act. This act gave the commissioner of the Maine Department of Inland Fisheries and Wildlife (MDIFW) the power to designate a species of wildlife as endangered or threatened in the state. It wasn't until the Endangered and Nongame Wildlife Fund (a voluntary income tax checkoff) was established in 1983 that MDIFW had the resources to begin a comprehensive look at Maine's wildlife and determine which species might be in trouble. Only animals that naturally occur in Maine were evaluated, and the study was limited to birds, mammals, reptiles, amphibians, and fish. Saltwater fish, managed by the Department of Marine Resources, were not included.

MDIFW had a long and difficult task. Fortunately, over one hundred knowledgeable people from Maine and the Northeast volunteered their time to help in the effort. They researched each species, proposed categories, developed criteria, and recommended species to be listed within each category. A public workshop was held to give all Maine's citizens a chance to participate.

After final comments were considered at a public hearing, the revised list was approved by the Commissioner in December 1986 (Table NG1). Six categories were defined for this list. Only species included in the first two, "Endangered" and "Threatened," are protected by the Maine Endangered Species Act. Some of those in the remaining categories receive protection from other state and federal laws.

This list helps MDIFW focus its efforts on species requiring special assistance. It will be reviewed regularly and updated as needed.

BALD EAGLE

We are encouraged by a steady long-term trend of bald eagle population growth in Maine (Table NG3). However, the rate of increase is relatively slow, because, without special management attention, Maine's bald eagles do not raise enough young eaglets annually to sustain future breeding populations.

Table NG3. Bald eagle nesting and productivity in Maine, 1962-70 and 1972-89.[1]

Year	Occupied Sites	Successful Sites N	Successful Sites %	No. Young Fledged	Young Fledged/Nest Occupied	Young Fledged/Nest Successful	Occupied Nests Fledging # of Young 0	1	2	3
1962	27	8	30	8	0.30	1.00	19	8	0	0
1963	32	9	28	12	0.38	1.33	23	6	3	0
1964	28	6	21	6	0.21	1.00	22	6	0	0
1965	33	4	12	4	0.12	1.00	29	4	0	0
1966	28	7	25	11	0.39	1.57	21	3	4	0
1967	21	4	19	6	0.29	1.50	17	2	2	0
1968	23	9	39	11	0.48	1.22	14	7	2	0
1969	29	11	31	15	0.52	1.36	18	7	4	0
1970	32	8	25	11	0.34	1.38	24	5	3	0
1972	29	8	28	8	0.28	1.00	21	8	0	0
1973	31	6	19	6	0.19	1.00	25	6	0	0
1974	36	12	33	12	0.33	1.00	24	12	0	0
1975	31	9	29	11	0.35	1.22	22	7	2	0
1976	41	12	29	19	0.46	1.58	29	6	5	1
1977	50	24	48	35	0.70	1.46	26	16	5	3
1978	62	20	32	32	0.52	1.60	42	9	10	1
1979	52	29	56	38	0.73	1.31	23	20	9	0
1980	56	29	52	40	0.71	1.38	27	19	9	1
1981	63	34	54	49	0.78	1.42	29	19	15	0
1982	72	36	50	56	0.78	1.56	36	17	18	1
1983	74	40	54	60	0.81	1.50	34	20	20	0
1984	66	35	54	46	0.70	1.31	31	24	11	0
1985	86	51	59	75	0.87	1.47	35	27	24	0
1986	89	50	56	76	0.85	1.52	39	25	24	1
1987	91	46	51	65	0.71	1.41	45	28	17	1
1989	109	45	41	70	0.64	1.56	64	20	25	0

[1]Data comparisons between the periods 1962-67 and 1968-89 are invalid due to variations in survey methodology, regional emphasis, and intensity. 1988 data were incomplete.

Eagle reproduction in Maine, monitored annually since 1962, remains 20-40% lower than in healthy populations in the Great Lakes states, the Pacific Northwest, the Chesapeake Bay region, and in Florida. The primary hinderance to eagle reproduction in Maine has been environmental contaminants that pass through the food chain and affect hatching success of eggs. A general decline of contaminants during the 1970's allowed some improvement in

eagle reproductive rates, however, remaining residues of DDE, plus other organochlorine contaminants (most notably PCB's, an industrial pollutant), and several heavy metals (particularly mercury), may continue to hinder the eagle population's rate of recovery. Most of these chemicals break down very slowly in the environment, and because Maine eagles often eat other fish-eating birds (e.g., cormorants, herons, and mergansers) as well as fish, they are especially vulnerable to accumulating contaminants.

Another problem arose for Maine's eagles in recent years. Changing land uses, mostly along coastal and other waterfront properties, threatened more than 35 eagle nests in Maine (human disturbances of nesting eagles were previously 2 or 3 incidents annually). A wide range of disturbances were involved that resulted in both nesting failures (compounding a continuing problem caused by chemicals) or permanent abandonment of nests that normally supported breeding eagles for at least 10 to 15 years.

In recognition of the impact habitat loss has on endangered and threatened species, the legislature amended Maine's Endangered Species Act (1988). The Commissioner of MDIFW was empowered to designate "Essential Habitats" by rule-making, which allows this Department to review and approve any projects permitted, licensed, funded, or carried out by any municipality or state agency. During the past year, 154 bald eagle nest sites across Maine were designated as "Essential Habitats" and are now subject to new protection standards.

Maine has had an aggressive management program for bald eagles since 1976. It has evolved to address the various threats that collectively cause bald eagles to be an endangered species. There is strong optimism for bald eagle recovery, and certainly plenty of work ahead to achieve that goal.

PEREGRINE FALCON

The peregrine is on the way back in Maine and throughout the East! Each year yields discoveries of new breeding pairs.

Peregrines declined worldwide and disappeared from the East in the early 1960's. Like bald eagles and many other birds of prey, they were victimized mostly by the effects of DDE in the environment.

Peregrine recovery is a broad, regionally coordinated program jointly undertaken by individual states, the U.S. Fish and Wildlife Service, and The Peregrine Fund. Reintroductions in Maine began in 1984, 10 years after inaugural efforts in the East. Maine has played a prominent role since, and it accounts for more than 9% of all peregrines released in the East.

Peregrines for reintroduction are produced by captive breeding birds in Idaho, under the auspices of The Peregrine Fund. Young peregrines arrive at their planned release sites when they are 4-5 weeks of age. After acclimating to their new surroundings, they are released at 6 weeks of age, but field technicians stay on duty for another 5 to 6 weeks. Daily care, feeding, and monitoring promotes normal development of young peregrines before they disperse in late summer.

Many peregrines die of natural causes, just like other wild animals, so it is important to maintain the supply of reintroduced peregrines until a viable population is re-established. The needs and options for continuing these peregrine releases are reviewed annually to optimize their effectiveness.

In 1989, MDIFW, in cooperation with the National Audubon Society, was able to make one reintroduction of 6 captive-produced peregrines at Borestone Mountain Sanctuary near Greenville; it was 100% successful. Fortunately, re-established pairs of breeding peregrines are contributing more young each year. The first successful nesting of peregrines in Maine was documented in 1988. Three pairs raised a total of 6 young peregrines in 1989. Preliminary surveys have located 3 new locations where active breeding behavior by peregrines has been noted thus far in 1990.

We anticipate an increasing number of peregrines at nesting eyries in upcoming years. If you witness the spectacular vertical dives of a peregrine, or otherwise suspect their presence, please contact the nearest MDIFW office. Watch and enjoy!

GOLDEN EAGLE

The golden eagle is apparently the rarest bird in the eastern United States. It once was an inhabitant of mountains from the southern Appalachians of Tennessee and Virginia north through Maine. Only one breeding pair remains in this region.

Only one resident breeding pair in Maine has been observed during the last 7 years. Only 3 other cliff eyries in Maine have been known to be inhabited by goldens at some time during the last 20 years, and only 3 young golden eagles have been produced by resident pairs in Maine within the last 10 years.

Certainly, the outlook is grim for the golden eagle. There are natural habitat limitations on the species in the East which have made them rare throughout recorded history. Golden eagles are relatively numerous in the Midwest, where open terrestrial habitats favor their normal lifestyle of preying upon small mammals. The extensive forestlands in Maine cannot be used as hunting areas by golden eagles.

Goldens in Maine traditionally preyed on wading birds (such as herons and bitterns) in open wetlands. Such a diet would have made them particularly vulnerable to environmental contaminants which also took their toll on reproduction of bald eagles and peregrine falcons in Maine. Great blue herons, apparently a mainstay food for golden eagles in Maine, contained some of the highest DDE residues ever found in wildlife. Apparently, contaminants have brought the few golden eagles of the northeastern United States to the threshold of extinction.

The immediate priority in Maine has been to manage the few suitable nesting habitats that once supported golden eagles. The last remaining pair is being carefully monitored to learn more of the species' needs in the East, and to identify factors limiting their existence.

PIPING PLOVER

Piping plovers are small, sand-colored shorebirds that nest on sandy beaches and dunes along the Atlantic Coast from South Carolina to Newfoundland. In Maine, the piping plover is listed as endangered by MDIFW because of its extreme rarity in the state and because of threats it faces during the nesting season.

Maine's population of piping plovers has been monitored annually since 1981 by biologists with the Maine Audubon Society. During this period, the number of pairs reported has fluctuated between a low of 7 pairs at 4 sites in 1983 and a high of 20 pairs at 7 sites in 1988. Ten different nesting sites have been used during the period. The overall population trend has been one of increase, due largely to intensive management at nesting sites and favorable habitat changes at one site—Seawall Beach. However, nesting plovers have not nested at 3 sites since 1981: Batson River, Wells Beach, and Pine Point.

Productivity of piping plovers in Maine, measured as number of chicks fledged per nesting pair, has ranged from a low of 0.9 chicks per pair in 1981 to a high of 2.4 chicks per pair in 1989. Statewide productivity since 1984 has been among the highest documented in any Atlantic Coast state or province. Productivity in Maine has exceeded 1.7 chicks per pair in 4 of the past 8 years. The trend in productivity has been generally one of increase since 1981. In 1989, 16 pairs of piping plovers nested at 6 sites in Maine and successfully fledged 38 chicks.

Monitoring and management of piping plovers in Maine has been carried out primarily by Maine Audubon Society and The Nature Conservancy biologists, with partial funding from MDIFW. Biologists conduct annual surveys of abundance and reproductive success and determine factors limiting productivity. Where necessary, nests are protected from human disturbance, pets, and

natural predators such as foxes, skunks, and crows. Management since 1988 has included use of wire enclosures to prevent nest predation by mammalian and avian predators.

Piping plovers are protected from take and harassment by the Maine Endangered Species Act of 1975 and the U.S. Endangered Species Act of 1973. A 1988 amendment to the Maine Endangered Species Act authorizes MDIFW to designate habitats essential to the conservation of endangered and threatened species, and to promulgate and enforce guidelines for the protection of these habitats. The process of determining "Essential Habitat" for the piping plovers in Maine is now underway.

LEAST TERN

Least terns are the smallest of four species of terns that nest along the coast of Maine. Least terns nest on a few sandy beaches in southern Maine. They are listed as endangered by MDIFW because of their rarity and because of threats to nesting colonies and habitat.

Nesting colonies of least terns in Maine are monitored and protected by Maine Audubon Society and The Nature Conservancy biologists, with partial funding provided by MDIFW. During the past 10 years, the statewide population has fluctuated from a low of 39 pairs at 3 sites in 1982, to a high of 124 pairs at 4 sites in 1986. Since 1979, total productivity in Maine has ranged from 12 to 82 young fledged annually. In 1989, 83 pairs nested at 5 sites and produced only 8 fledglings.

Threats to nesting colonies of least terns in Maine include: human disturbance; destruction of nests or young by humans, foxes, skunks, raccoon, crows, dogs, and cats; and habitat alteration from coastal development. Management of least terns in Maine includes protection of nesting colonies with symbolic fencing, snow fencing, or chicken wire. Symbolic fences are fences of stakes and twine with warning signs around the nesting colonies. Public education to inform recreational beach-goers and local residents about the conservation needs of least terns is another important management activity.

GRASSHOPPER SPARROW

Grasshopper sparrows are considered endangered by the MDIFW because of low numbers and threats to their habitat. Maine is at the extreme northeastern edge of the range of the grasshopper sparrow. The species now nests at only three locations in the southern part of the state. Grasshopper sparrows inhabit large sandy grasslands and blueberry barrens that are vegetated with sparse bunch grasses. These habitats are also rare in Maine.

The largest nesting population of grasshopper sparrows in Maine occurs on 600 acres of blueberry barrens and grasslands on the Kennebunk Plains in West Kennebunk, York County. Only 18 nesting pairs occurred on the Kennebunk Plains in 1989, compared to 20-25 pairs that occurred there between 1984 and 1986. This decline is presumably a result of habitat changes brought about by use of herbicides to encourage establishment of a blueberry monoculture.

The Kennebunk Plains has been purchased by the Land For Maine's Future Board, in cooperation with The Nature Conservancy, the Kennebunk Water District, and MDIFW. The property will be managed by MDIFW as a Wildlife Management Area. Habitat restoration for grasshopper sparrows and other grassland birds will be a high priority.

AMPHIBIANS AND REPTILES

Thirty-eight kinds of frogs, toads, salamanders, snakes, and turtles are known to live in Maine. Collectively called herptiles, or "herps" for short, these animals are some of the smallest, most inconspicuous, and perhaps least understood of all vertebrate species. A few of them are also among the rarest of Maine's wildlife.

Very little has been known about reptiles and amphibians in Maine. In 1984, MDIFW, The Nature Conservancy, Maine Audubon, and the Wildlife Department of the University of Maine initiated the Maine Amphibian and Reptile Atlas Project (MARAP). Now in its sixth year, the project has enlisted the aid of many enthusiastic and dedicated volunteers to record observations of both rare and common herps. Information collected by MARAP observers is already increasing our knowledge of amphibians and reptiles in Maine. New locations for some of our rarest herps have been documented.

MDIFW has also funded several independent surveys targeting endangered and threatened herps. As a result, several new sites have been identified, and at least one reproducing population of Blanding's turtles has been verified. This information will serve as a starting point from which to assess species status and develop conservation strategies.

Four species are of special interest to MDIFW. In 1986, the black racer snake and eastern box turtle were officially listed as Endangered Species in Maine. The spotted turtle and Blanding's turtle were listed as Threatened. All of these species are at or near the northern edge of their range in Maine and probably were never very common.

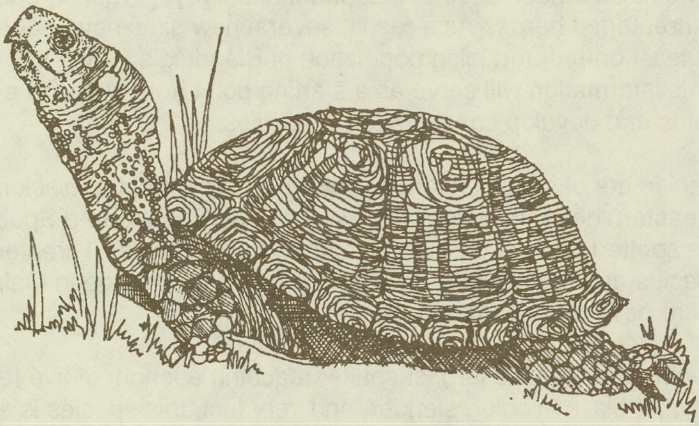
Black racers are Maine's largest snake, reaching a length of five feet or more. Shiny, jet black in color, slender, and very fast, this species is an in-

habitant of open fields, farms, swamps, forests, and woodland edges. It is known to exist in less than ten Maine locations, all in York and southern Oxford counties, and is believed to be declining in range and numbers. Habitat loss, particularly from development, is the major threat to black racers in Maine today.

Box turtles are perhaps the rarest species, and their status is the least well known of Maine's herps. A terrestrial species, this turtle is found primarily in moist woodlands, meadows, and riparian areas. It is long-lived, capable of surpassing 100 years of age. Box turtles are often kept as pets, and are frequently imported from other states. At this time, it is impossible to distinguish native box turtles from "escapees", consequently, the five or six sightings of box turtles in Maine during the past several years may not represent the current status of this species. Both habitat loss and over-collecting are believed to have caused the box turtle to become endangered in Maine, and still threaten the species today.

Both of Maine's Threatened herps, the spotted and Blanding's turtles, are aquatic species preferring clean, shallow waters with abundant vegetation. They are known to occur at the same sites. While spotted turtles are characterized by yellow spots on their slightly flattened upper shell, Blanding's turtles are flecked with yellow streaks on a more helmet shaped shell, and have a bright yellow patch on their chin and throat. There are less than ten known locations for Blanding's turtles in Maine, all in York County. Spotted turtles are recorded from about ten different sites and have been documented as far east as Woolwich. Loss of habitat, primarily draining and filling of wetlands, is the most serious threat to these two species.

Through MARAP and other independent studies, MDIFW will continue to collect information about Maine's herps. MDIFW will also develop species assessments and management systems for each of the key species during the next two years.



GAME BIRDS

Maine game birds are called either resident or migratory based on their behavior. For administrative convenience, it is easier to deal with these two groups separately.

Migratory game birds are managed in accordance with the Migratory Bird Treaties between the United States and other Nations. Laws which implement these treaties assign the Secretary of the Interior responsibility for protection of migratory bird populations.

Resident game birds are the sole jurisdiction of the State of Maine. These species include the ruffed grouse (or "partridge") and the wild turkey, which, incidentally, is classified as a big-game species by Maine law. Ring-necked pheasant populations also exist at low levels, but only where food and weather conditions permit winter survival. These wild populations are augmented by a small annual release of game-farm pheasants. Another resident upland game bird (not hunted in Maine) is the spruce grouse.

The remaining game birds of interest to Maine hunters are migratory species. Upland migratory birds include American woodcock and common or Wilson's snipe. Of lesser importance to Maine gunners are the Virginia and sora rails, the American coot, and the common moorhen. Waterfowl as a group are also migratory birds. Maine waterfowl include various species of inland breeding ducks, Canada geese, and coastal breeding American eider. The mourning dove, although not hunted in Maine, supports the largest harvest of any migratory bird in North America. Maine's dove populations are monitored annually through breeding surveys designed to follow population trends.

WILD TURKEY

Historical records document the existence of wild turkeys in coastal areas of Maine as far east as the Penobscot Bay area. Unfortunately, the last of Maine's native wild turkeys disappeared in the 1800's because of unrestricted hunting and extensive forest-clearing. The reversion of thousands of acres of farmland back to wooded habitat has greatly enhanced the prospects for reestablishment of wild turkeys into former ranges.

As early as the 1960's, Maine sportsmen began "thinking turkey". Fish and game clubs in the Bangor and Windham areas made attempts to reestablish turkeys into their areas using birds raised from part wild and part game-farm stocks. The Bangor stocking was unsuccessful, and the Windham population persisted in low numbers into the 1980's.

In the 1960's and 1970's, considerable work was done in other states to establish wild turkeys into former and new ranges of suitable habitat. Researchers noted the key to each success was to remove a small number of wild birds from one site and release them into suitable unoccupied habitat.

Maine too became involved in a similar program in 1977, when Department biologists acquired 41 wild turkeys from Vermont and released them in York County. By the early 1980's, the York County population had become large enough to serve as a source of birds for new release sites. In the spring of 1982, 33 birds were captured in York County and released in Waldo County. In the winter of 1984, 19 additional birds were captured in York County and released in Hancock County.

The Waldo County release was successful and resulted in a stable population that persists today. Unfortunately, the Hancock County wild turkeys failed to produce a self-sustaining population. Several factors appeared to contribute to the failure, but illegal shooting was believed to be the major cause.

Hunting Seasons

By 1986, the York County wild turkey population had increased to a sufficient size to allow a spring (males only) hunting season. Wild turkeys, like white-tailed deer, are polygamous, meaning that only the dominant males in the population mate with the females. The remaining males are considered surplus. Courtship activities for wild turkeys in Maine begin in April and last into early May. The spring hunting season is timed to begin after the breeding period is over, and it is limited to bearded turkeys only. Experience has shown, spring turkey hunting provides a quality big game hunting opportunity without jeopardizing restoration efforts.

Each spring, a maximum of 500 hunters are allowed to hunt wild turkeys for approximately 3 weeks in the area south and west of the Ossipee and Saco Rivers. The harvest is limited to taking bearded turkeys only, and generally occurs (depending on spring weather) after the breeding season. Many hunters have enjoyed this new spring recreational activity, and during the past 5 seasons, 9, 8, 16, 19 and 15 birds have been taken respectively (Table GB1). The low number of harvested birds is a testament to the wariness of this magnificent game bird.

Table GB1. Wild turkey hunting effort and harvests, 1986-90.

Year	Number of applicants	Number of permits	Wild turkeys harvested
1986	536	500	9
1987	519	500	8
1988	355	355	16
1989	463	463	19
1990	499	499	15

Highlights from a survey of 1989 Maine turkey hunters revealed that: only 52% of the permit holders actually hunted turkeys in Maine in 1989; 95% of those hunters that successfully bagged a turkey scouted a surprisingly high average of 20 days per individual prior to the season; and most participants in the hunt rated the overall experience as "good".

Management and Research

In recent years, emphasis has been placed on introducing wild turkeys into all suitable habitat between York and Waldo Counties. A "leap frog" trap and transfer technique has been initiated with a goal of eventually joining these two populations.

Early efforts have been augmented since 1987 by the release of wild turkeys captured in Connecticut. These Connecticut turkeys were released at a number of sites in York, Cumberland, and Kennebec Counties in a northward progression. We still believe that it is necessary to get as many wild turkeys "on the ground" as soon as possible. The addition of wild birds from a different stock is believed necessary to improve reproductive success.

We remain optimistic that this goal-oriented reintroduction program will succeed in reestablishing wild turkeys into all suitable habitat in Maine. We are indeed thankful for all the cooperation, financial support, and hands-on participation we've received from the public, L.L. Bean Inc., Connecticut Department of Environmental Protection, and especially the Maine and Connecticut State Chapters of the National Wild Turkey Federation.

IMPORTANT!! Rearing and releasing "game farm" strains of wild turkeys can seriously impact the future success of this program, and it is not allowed by the Department. Birds from these strains do not survive or reproduce well in the wild, and they only introduce inferior breeding stock into wild populations.

Individuals interested in becoming involved in wild turkey management are encouraged to contact the Maine State Chapter of the National Wild Turkey Federation, South Windham, Maine 04082.

RUFFED GROUSE

The ruffed grouse (partridge) is considered by many, the number one game bird in Maine. Data collected in Maine in the early 1980's show that an estimated 100,000 hunters harvest over 500,000 grouse annually. Hunter survey results show that approximately half of all licensed hunters in Maine hunted grouse and/or woodcock in 1987. While no data exist on recent harvests, successful bird hunters (and moose hunters in 1989) report grouse to be even

more numerous now then they were in the early 1980's. This should not be surprising, as grouse populations are well known for their periodic cycling between high and low numbers.

Ruffed grouse are a product of the forest. The amount and quality of Maine's forests are constantly changing, and the impact of these changes on grouse populations are difficult to predict. Fortunately, however, the future for the ruffed grouse appears bright. Timber harvesting is revitalizing grouse habitat as more and more commercial timber companies, state and private foresters, and small woodlot owners are utilizing harvesting practices which improve or sustain habitat for this species.

RING-NECKED PHEASANT

Lack of suitable habitat and severe winter weather limit distribution of the ring-necked pheasant in Maine. As a result, Maine hunters have few opportunities to pursue wild populations of this popular game bird. Most pheasant taken in Maine are from game-farm stock, which is annually purchased and reared for release prior to the hunting season.

Funding for the Department's pheasant stocking program is derived entirely from the sale of a pheasant hunting stamp. The stamp is required to legally take ring-necked pheasants during the hunting season. Income from the sale of pheasant stamps is used to purchase a small number of six-week old birds from commercial game-farms.

Volunteer pheasant cooperators provide labor, pens, and food for the Department-owned birds. These cooperators accept the Department's young pheasants and raise them for release in the fall. It is safe to say, that without the contributions of these cooperators, there would be no stocked pheasants for Maine hunters.

These birds are released just prior to the hunting season and are available to any licensed Maine hunter who has purchased the state pheasant stamp. Locations of release sites, and dates of release, are determined by the cooperators. Release conditions are, however, first approved by the Regional Wildlife Biologist.

Reduced annual sales of the pheasant stamp have resulted in a gradual decline in the number of birds available for stocking each year. The number of pheasants purchased annually for release by cooperators during the past five years has averaged 1,713 birds per year.

In 1990, a bid was approved for the purchase of 1,934 six-week old pheasants. These birds will be raised for release by 15 cooperators.

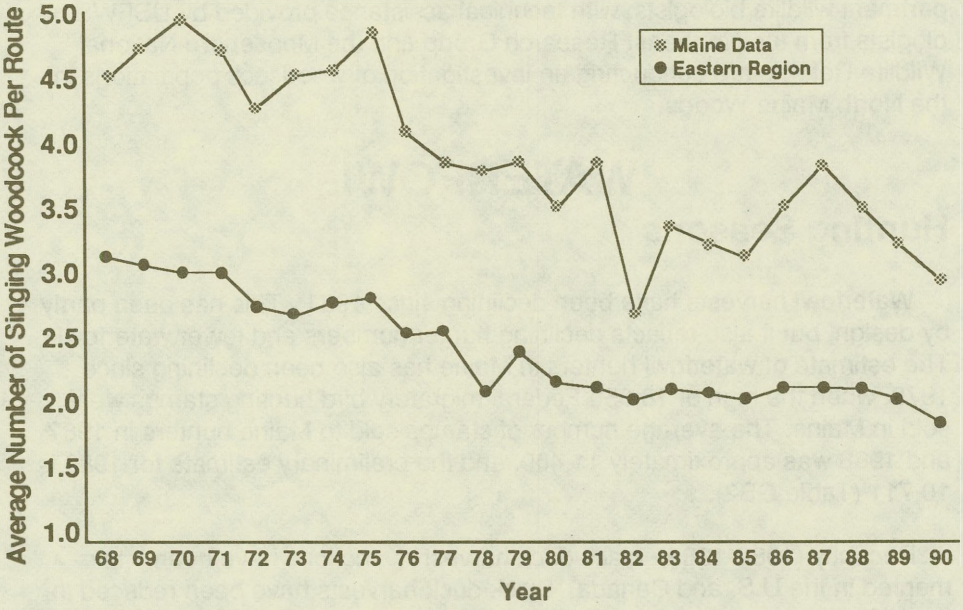
WOODCOCK

Hunting Season

A rangewide decline in woodcock numbers since 1968 has resulted in increasingly restrictive hunting regulations. In 1985-86, eastern states were required to shorten their woodcock hunting seasons, select opening dates no earlier than 1 October, and reduce the daily bag limits from 5 birds to 3. These hunting season restrictions have been in place since the 1985 season.

While rangewide populations continue to decline at approximately 2 percent each year, Maine's singing-ground survey results are less discouraging (Figure GB1). Since 1982, spring weather conditions have been generally favorable for nesting and brood rearing. Unfortunately, the past few winters have been rough on birds on their wintering grounds. Improved habitat, coupled with rangewide conservative harvests, are expected to play an important role in woodcock population recovery in the future.

Figure GB1. Breeding population index for woodcock, 1968–90.[1]



[1]FWS data, 1990 Administrative Report

In 1988, an estimated 3,200 waterfowl hunters harvested about 14,100 woodcock in Maine. These data are derived from a survey of duck stamp purchasers who also hunted woodcock. Only about 1/3 of Maine's 1988 duck stamp purchasers also hunted woodcock. These data can only be used for trend analysis since many Maine woodcock hunters do not buy duck stamps and therefore are not represented in the federal survey. The 1988 figures

imply that hunter success declined from 6.5 woodcock per season in 1987 to only 4.4 in 1988. The percentage of duck stamp purchasers who reported hunting woodcock in 1988 also declined from 1987.

Management and Research

There is increasing concern for the woodcock throughout it's range. During the last 20 years, interest in woodcock hunting has grown steadily, and range-wide harvests have increased. In the northeast, particularly, this increase in hunting pressure came at a time when woodcock habitat was being lost to urban and industrial development, and a large amount of forestland grew into stages not suitable for woodcock. The rangewide population decline can be seen graphically in the Eastern Region's singing-ground survey results for the last two decades (Figure GB1).

In recent years, interest has turned to commercial timberlands as being a potential bright spot for woodcock habitat. While the soils may not be as productive as abandoned farmland, the vast acreage of young forests created by commercial clearcuts warrant attention. As this publication goes to press, Department wildlife biologists, with technical assistance provided by USFWS biologists from the Northeast Research Group and the Moosehorn National Wildlife Refuge, are conducting an investigation of woodcock populations in the North Maine Woods.

WATERFOWL

Hunting Seasons

Waterfowl harvests have been declining since 1981. This has been partly by design, but it also reflects declining hunter numbers and fewer waterfowl. The estimate of waterfowl hunters in Maine has also been declining since 1978, when the high of 18,650 Federal migratory bird hunting stamps were sold in Maine. The average number of stamps sold to Maine hunters in 1987 and 1988 was approximately 11,400, and the preliminary estimate for 1989 is 10,711 (Table GB2).

Recently (1982-1989), black duck harvest restrictions have been implemented in the U.S. and Canada. Black duck harvests have been reduced in the U.S. by 43% since the 1977-81 period, and the black duck kill in Maine has also been reduced 58% (Table GB3).

Sixty percent of all ducks bagged by Maine gunners in 1988 were dabbling ducks, about 23% were sea ducks, nearly 14% were diving ducks, and the rest were mergansers (Table GB4).

Table GB2. Maine and Atlantic Flyway waterfowl harvests and duck stamp sales, 1981-1989.

Year	WATERFOWL HARVEST Maine	WATERFOWL HARVEST Atlantic Flyway	DUCK STAMP SALES Maine	DUCK STAMP SALES Atlantic Flyway
1976-80 average	83,360	1,941,460	17,444	429,533
1981	74,000	1,889,900	16,657	407,906
1982	75,000	1,608,700	14,470	402,929
1983	85,900	1,669,800	14,685	390,896
1984	61,600	1,810,500	13,634	412,866
1985	69,400	1,400,600	13,280	382,546
1981-85 average	73,180	1,675,900	14,545	399,429
1986	73,400	1,412,500	13,185	387,744
1987	54,800	1,388,800	12,274	367,049
1988	41,800	1,001,700	10,461	341,901
1989[1]	45,800	1,168,300	10,711	335,381

Table GB3. Maine and Atlantic Flyway black duck harvest data, 1977-1989.

State	BLACK DUCK HARVESTS 1977-81 Average	1983-89 Average	Percent Change
Maine	20,820	8,714	-58
Vermont	6,420	4,000	-38
New Hampshire	6,940	4,414	-36
Massachusetts	24,540	16,700	-32
Connecticut	8,140	4,586	-44
Rhode Island	5,680	2,714	-52
New York	43,920	27,200	-38
Pennsylvania	11,040	5,314	-52
West Virginia	1,120	471	-58
New Jersey	37,220	21,586	-42
Delaware	9,760	6,229	-36
Maryland	29,400	15,400	-48
Virginia	19,040	12,129	-36
North Carolina	11,140	6,486	-42
South Carolina	7,240	3,414	-53
Georgia	2,360	1,357	-42
Florida	860	296	- 66
Atlantic Flyway	245,640	141,010	- 43

Regulation changes during recent years have impacted the kill of dabbling and diving ducks. The 1988 kill of dabblers and divers was down by nearly 48 percent from the 1976–1985 average for these species. The 1988 harvest of sea ducks and mergansers, compared to the same period, was down by 43%.

Table GB4. Species composition of Maine's 1988 waterfowl harvest and average harvest, 1976-85.

Species	Percent	1988 Harvest	Average Harvest 1976-85
Common Merganser	1.11	465	684
Red-Breasted Merganser	0.61	253	402
Hooded Merganser	1.31	548	1,166
Sub-total Mergansers	3.03	1,266	2,252
Mallard	9.71	4,056	4,850
Mallard-Black Hybrid	0.41	169	471
Mallard (hand-reared)	0.18	75	174
Black Duck	25.51	10,656	18,182
Gadwall	0.00	0	33
American Widgeon	0.18	75	293
Green-winged Teal	8.23	3,435	9,159
Blue-winged Teal	0.65	270	2,061
Northern Shoveler	0.00	0	13
Pintail	0.73	305	451
Wood Duck	14.40	6,015	10,568
Sub-Total Dabblers	60.00	25,056	46,255
Redhead	0.00	0	10
Greater Scaup	0.00	0	240
Lesser Scaup	0.09	36	315
Ring-neck Duck	2.41	1,007	3,119
Common Goldeneye	6.26	2,616	3,538
Barrow's Goldeneye	0.51	215	123
Bufflehead	4.50	1,880	5,304
Ruddy Duck	0.13	54	58
Sub-total Divers	13.90	5,808	12,649
Old Squaw	3.89	1,623	1,395
Harlequin	0.00	0	7
Common Eider	14.33	5,984	9,779
King Eider	0.00	0	6
Common Scoter	0.24	101	1,211
White-winged Scoter	3.89	1,623	2,174
Surf Scoter	0.73	304	2,447
Sub-total Sea Ducks	23.08	9,635	17,029
All Species	100.01	41,765	78,185

Research and Management

The 1985 species assessments combined the earlier Canada goose and wild duck species plans into one document. The most significant change in the latest revisions of these plans was the change from harvest oriented to breeding population oriented goals and objectives. These changes have resulted in a more responsive program for waterfowl management in Maine.

Maine waterfowl are now being managed to increase certain breeding populations. Low populations of black ducks have recently caused major

changes in regulations which altered traditional seasons enjoyed by Maine waterfowl hunters.

More recently, declines in North American waterfowl populations have resulted in further curtailment of waterfowl hunting seasons and bag limits. These declines have been caused by a prolonged and severe drought in the prairie regions of the U.S. and Canada. The decade of the eighties has not been bright for waterfowl populations or hunters.

One method used to increase breeding populations in Maine has been to eliminate, where and when possible, significant forms of non-hunting mortality. Lead poisoning of waterfowl is an example of this type of mortality. This national problem affects many thousands of birds annually.

Studies in Maine during 1985 and 1986, revealed significantly high numbers of waterfowl had ingested lead pellets or absorbed lead salts into their livers. These findings convinced the Commissioner and the Fish and Wildlife Advisory Council to phase in the use of nontoxic shotshells for all waterfowl hunting in Maine over three hunting seasons (1986-1988).

Maine hunters had their first statewide steel shot hunting season in 1988. This was three years ahead of the deadline required by the U.S. Fish and Wildlife Service's National plan. Maine hunters have accepted the facts and shouldered the responsibility for using the latest in shotshell technology. Many were pleasantly surprised with their results. These new steel loads and shot combinations have proven to be effective for Maine conditions.

Habitat protection and enhancement efforts are another form of management which the Department is using to increase waterfowl breeding populations. Revenues generated from the sales of state waterfowl hunting stamps and art prints have been dedicated to acquisition and development of wetland habitat.

Coordination of Maine habitat protection efforts among several state and federal agencies, and private organizations, has resulted in some key land purchases that will benefit Maine waterfowl now and in the future. The stimulus for this coordinated effort has been the implementation of the North American Waterfowl Management Plan and its various joint ventures.

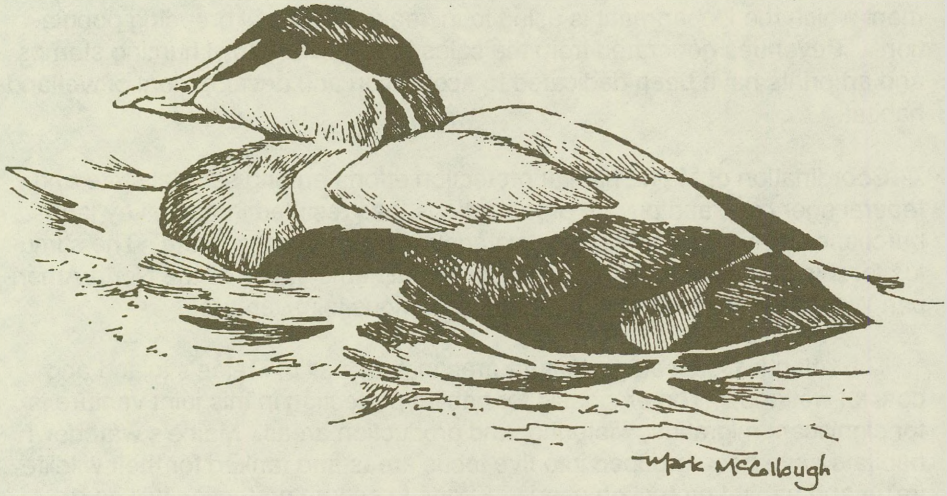
The Atlantic Coast Joint Venture area includes all of Maine's inland and coastal wetlands. The emphasis for habitat protection in this joint venture is for significant migration, wintering, and production areas. Maine's waterfowl habitats have been grouped into five focus areas and ranked for their wildlife value and habitat protection needs. Efforts to secure protection will be directed toward the most significant and vulnerable areas first.

The Cobscook Bay focus area, and the Merrymeeting Bay - lower Kennebec River focus area, are the two priority regions selected for first step projects in Maine. Initial efforts in these areas have resulted in a coordinated plan to secure protection for these important ecosystems. The east coast region (Penobscot Bay east), west coast region (west of Penobscot Bay), and inland wetlands focus areas will be considered as implementation of the North American Waterfowl Management Plan proceeds.

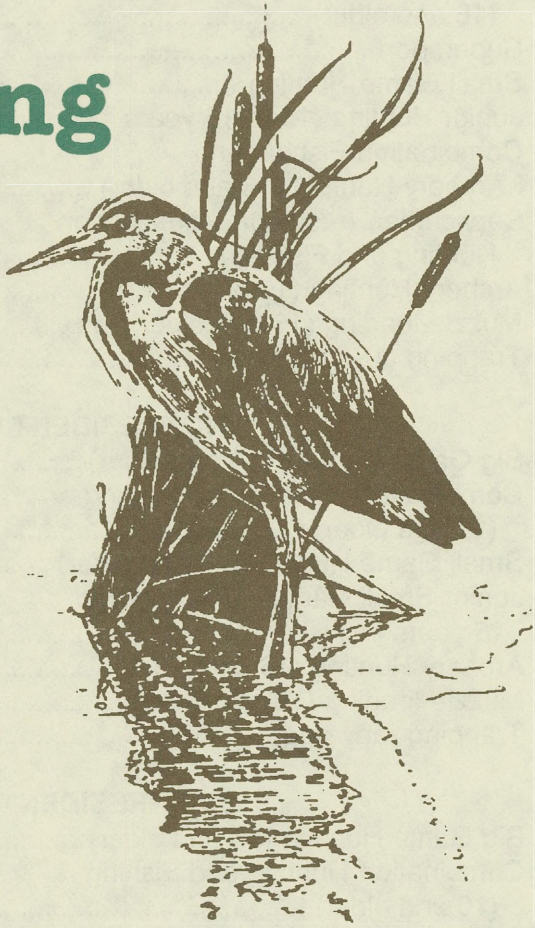
Current waterfowl research efforts are aimed at measuring and tracking trends in breeding populations and the harvests they support. Developmental studies are currently underway to determine the best way to survey pairs of breeding coastal eiders and inland waterfowl.

A statewide survey of inland waterfowl breeding pairs was initiated in 1990 as part of a larger study designed and funded by the North American Waterfowl Management Plan's Black Duck Joint Venture. Twenty-five randomly located plots were surveyed by Maine biologists using a U.S. Fish and Wildlife Service helicopter flown slowly at 100 to 150 feet above ground level. All open waters found within the plots were surveyed, and locations of waterfowl were recorded. Analysis of this data will provide trend estimates for common inland breeding waterfowl over a five-year period.

Statewide surveys of waterfowl production are also continuing to provide an index to our populations status. These long-term brood count surveys have provided a means of following trends in waterfowl breeding populations since the mid-1950's.



There's something wild lurking on your tax return!



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1990 LICENSE FEES

RESIDENT

Hunting (16 and older)	$15.00
Combination Hunting and Fishing (16 and older)	28.00
Supersport	38.00
Small Game Hunting	8.00
Junior Hunting (10 to 15 years inclusive)	3.00
Combination Fishing and Archery Hunting (16 and older)	28.00
Serviceman (resident) Combination Hunting and Fishing	15.00
Archery Hunting (16 and older)	15.00
Muzzle-loading (16 and older)	7.00
Trapping (16 and older)	29.00

NONRESIDENT CITIZEN

Big Game Hunting (10 and older)	77.00
Combination Hunting and Fishing (16 and older)	107.00
Small Game Hunting (16 and older)	47.00
Junior Small Game Hunting (10 to 15 years inclusive)	23.00
Archery Hunting (16 and older)	47.00
Muzzle-loading (16 and older)	25.00
Trapping (any age)	304.00

NONRESIDENT ALIEN

Big Game Hunting (10 and older)	117.00
Combination Hunting and Fishing (10 and older)	160.00
Small Game Hunting (16 and older)	62.00
Archery Hunting (16 and older)	62.00
Muzzle-loading (16 and older)	50.00

NOTES

- Above prices do not include $1 agent fee.
- All applicants for an adult firearms hunting license must show proof of having previously held an adult license to hunt with firearms, or having successfully completed an approved hunter safety course.
- A small game license permits the hunting of all species except deer, bear, turkey, moose, raccoon, and bobcat.

PERMIT APPLICATION DEADLINES

Permits, all issued by lottery methods, are now required to hunt antlerless deer, moose, and turkey in Maine. Applications for all three lotteries are available from the Maine Department of Inland Fisheries and Wildlife, 284 State Street, Station #41, Augusta, Maine 04333.

The application periods for these species are as follows:

Antlerless Deer ..... mid-June through August 15 annually
Moose ..... mid-January through April 30 annually
Turkey ..... mid-December through February 1 annually

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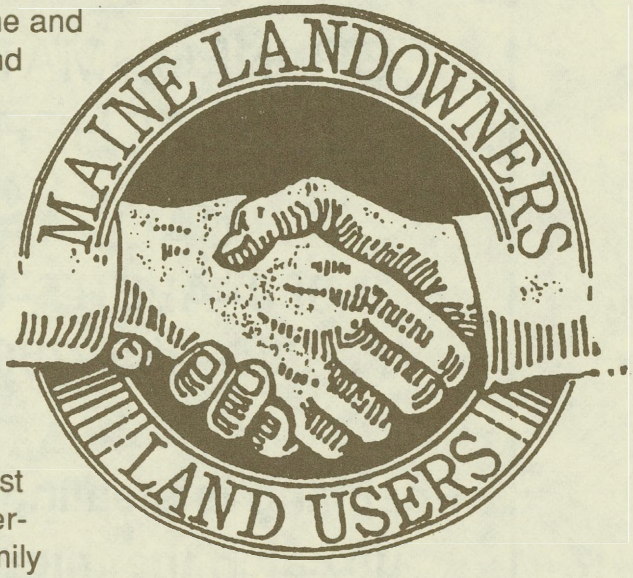
In Maine, where only 5 percent of the total land area is in public ownership, the private landowner's role in wildlife management cannot be overstated. The underlying fact is that most wildlife in this state is produced on privately-owned land. It is also on land owned by others that most people take their enjoyment of wildlife.

The way landowners use their property has a significant bearing on the abundance and diversity of most game and nongame species, and the very existence of some land-intensive forms of recreation, such as hunting, is heavily dependent on the good will of these individual and corporate landowners.



Much of northern Maine is in large forest and agricultural ownerships; elsewhere, family farmers and small woodlot owners dominate rural ownership patterns. These owners of 95 percent of the land in this state have a long history of stewardship and of sharing their land with others for recreational uses.

Despite additional acreages of private property being closed annually to public recreation — largely the result of thoughtless acts by recreational users — there still remains abundant opportunity for public recreation on privately owned land in Maine. Preserving the tradition of easy access to private property will take diligence by all concerned, but particularly it means that land users must treat the land and its owners the same way they would want someone else to treat their private property: with care and respect.

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